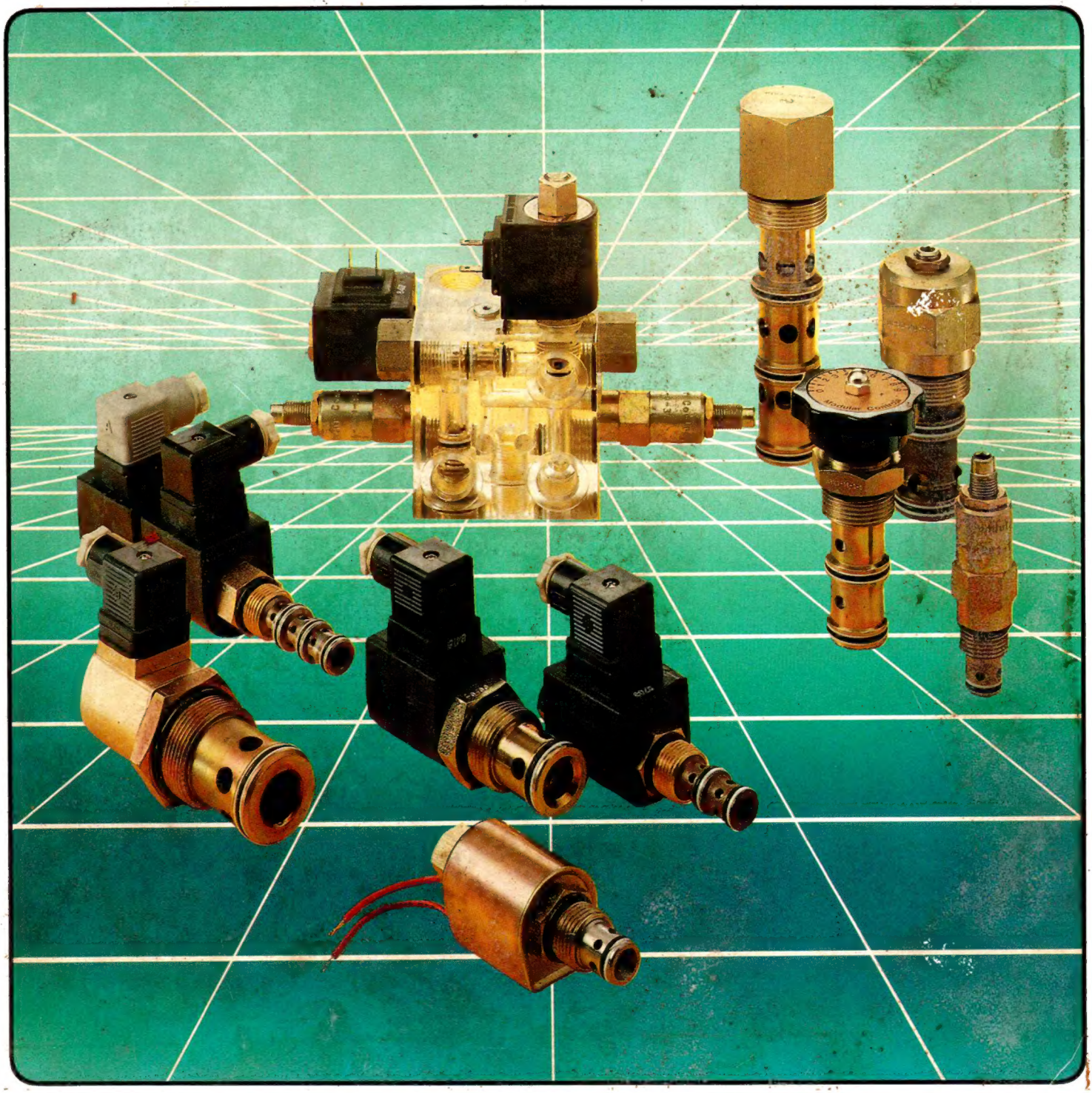
VICKERS

MODULAR

Screw-in cartridge valves



Screw-in cartridge valve technology

. . . to fullfil widely varying needs

Vickers Modular cartridge and manifold systems are extensively used for convenient and reliable space-saving hydraulic installations:

- Construction equipment
- Farm machinery
- Utility service vehicles
- Refuse equipment
- Marine applications
- Forestry equipment
- Mining equipment
- Lift trucks
- Machine tools
- Plastics processing machines
- Robotics and materials handling equipment
- Aerial work-platforms
- and a host of further industrial and mobile applications

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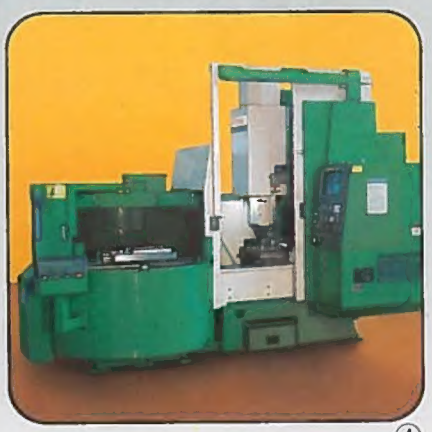

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Typical applications for screw-in cartridge valve technology

① Fast and reliable hydraulic control on cotton pickers (Photo courtesy J. I. Case)
② High performance hydraulic systems on mining trucks (Photo courtesy Dresser)
③ Efficient system solution for an aerial work platform (Photo courtesy Calavar)
④ Computer-controlled vertical machining center (Photo courtesy Mazak)

The screw-in cartridge valve
with 5 effective advantages

1. Outstanding choice of function/size combinations

- Full range of functions: pressure, flow and directional, including proportional control models. Variations include check valves, shut-off valves, brake release valves and pipe-break valves (velocity fuses).
- Choice of actuation: solenoid, electro-proportional, hydraulic or manual (rotary or linear).
- Multiple variations based on three nominal sizes: 10, 16 and 20.

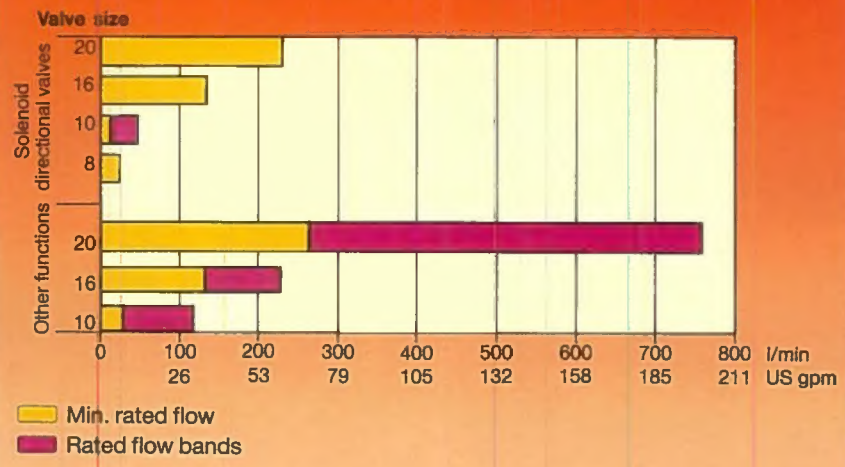
2-position, spring offset, poppet type solenoid valve | Differential pressure sensing valve | Electro-hydraulic proportional priority flow regulator | Manual rotary valve

Application benefits

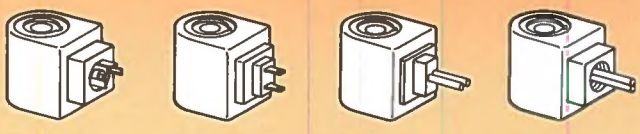
- 3 sizes, each with up to 8 functional groups accommodated in up to 4 cavities per size.
- A range of AC and DC solenoid voltages and connector types.
- Choice of pressure and flow adjustment ranges and methods.
- Customized, economically-priced system solutions for widely differing hydraulic circuits.

2. Selection from a broad flow range
For operating pressures up to 345 bar (5000 psi).

Solenoid directional and other functions



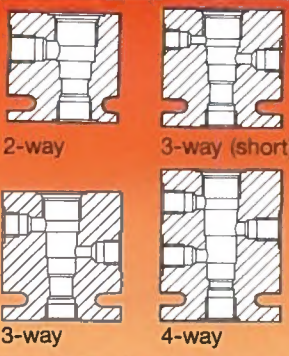
Solenoid connection options



Application benefit

- Wide range of flow ratings and solenoid connections from which to select the right cartridge for a particular application.

3. Standard single-cavity housings
For line-mounted valves



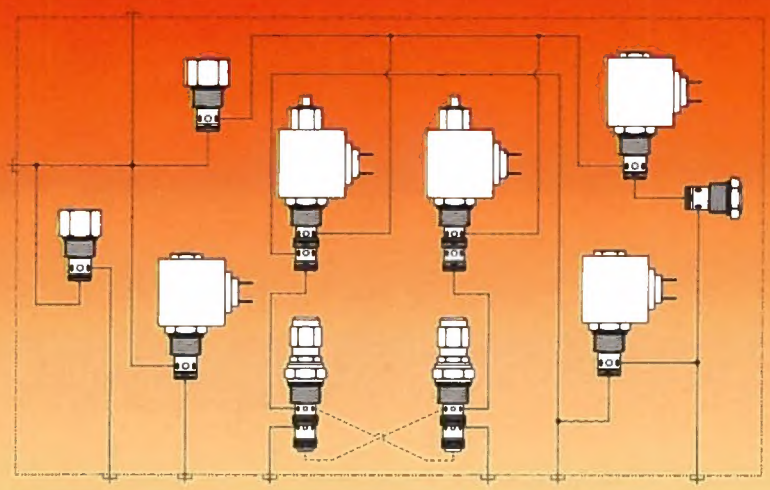
2 ranges of standard housings, each in 4 cavity types, for valve sizes 10, 16 and 20.

- Light-duty range (SAE ports): 207 bar (3000 psi).
- Heavy-duty range (SAE and BSPF port options): NFPA pressure-rated (10 million cycle fatigue rating) to 207 bar (3000 psi).

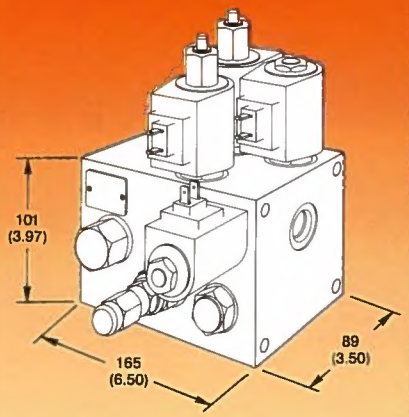
Application benefits

- Standardized assembly.
- Off-the-shelf availability.
- Effective alternative to customized MCD packages.
- Fast and convenient system mock-up for prototype development.

4. Custom-designed MCD manifolds for cost-effective systems



Example of a modular circuit design (MCD)



Compact block system

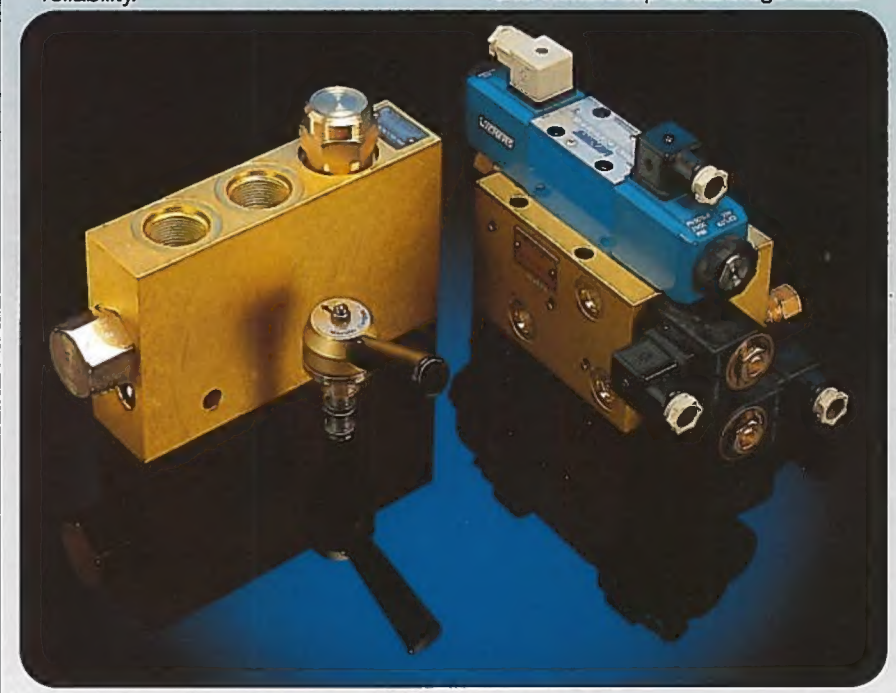
Vickers Modular MCDs (Modular Circuit Designs) are valve packages containing any combination of screw-in cartridge valves in a manifold block dedicated to the hydraulic control of a particular application. MCDs can be as extensive as necessary to meet the most complex and/or stringent specifications, or as simple as two or three cartridges in a basic single manifold.

Modular Circuit Design may be designed and made by Vickers Modular or by customers. Manifolds can be designed to house the requisite cartridges, pilot pistons, orifice discs and any other components needed for individual applications. Vickers standard-cavity tooling provides precision machining of standard cartridge cavities.

Application benefits

- Efficient and fuss-free systems. The cartridge concept facilitates improved productivity from customized circuits.
- Maximum savings on piping and fittings costs, plus faster installation and commissioning (start-up).
- Fewer potential leakage points, ensuring cleaner, safer application environments.
- Increased ability to withstand vibration, giving optimum machine reliability.
- Faster on-site servicing, or trouble-shooting, of screw-in valves concentrated in one place, maximizing machine utilization potential.
- Response time and power-transmission efficiency gains, by eliminating many of the hoses, tubes and fittings necessary in traditional installations.
- Compact, neat assemblies, making for space and weight savings.

Block using Vickers Modular screw-in and Vickers slip-in cartridge valves



5. Extensive compatibility

Vickers Modular screw-in cartridge valves in high power manifolds can be combined with other Vickers components: e. g. slip-in cartridge valves (to DIN 24342) and ISO 4401-sized directional valves, to solve virtually any machine circuit requirement.

Application benefits

- Combinations can be built into a dedicated MCD manifold.
- Components sourced from a single manufacturer.

The complete screw-in cartridge valve range

A selection for today's and tomorrow's applications

Function	Series	Max. rated flow l/min (USgpm)	Max. operating pressure, bar (psi)
1 Solenoid directional controls	8 10 16 20	23 (6) 45 (12) 132 (35) 227 (60)	207 (3000)
2 Non-solenoid directional controls	10 16 20	30 (8) 132 (35) 265 (70)	207 (3000)
3 Proportional pressure and flow controls	10 16	57 (15) 132 (35)	207 (3000)
4 Pressure controls	10 16	114 (30) 303 (80)	345 (5000)
5 Flow controls	10 16 20	68 (18) 227 (60) 634 (150)	207 (3000)
6 Check valves	10 16 20	76 (20) 189 (50) 340 (90)	207 (3000) 207 (3000) 207 (3000)
7 Load controls	10 16	76 (20) 151 (40)	345 (5000)
8 Logic elements	10 16 20	57 (15) 189 (50) 303 (80)	345 (5000)

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This catalog provides technical details of the extensive range of Vickers Modular screw-in cartridge valves and standard assemblies

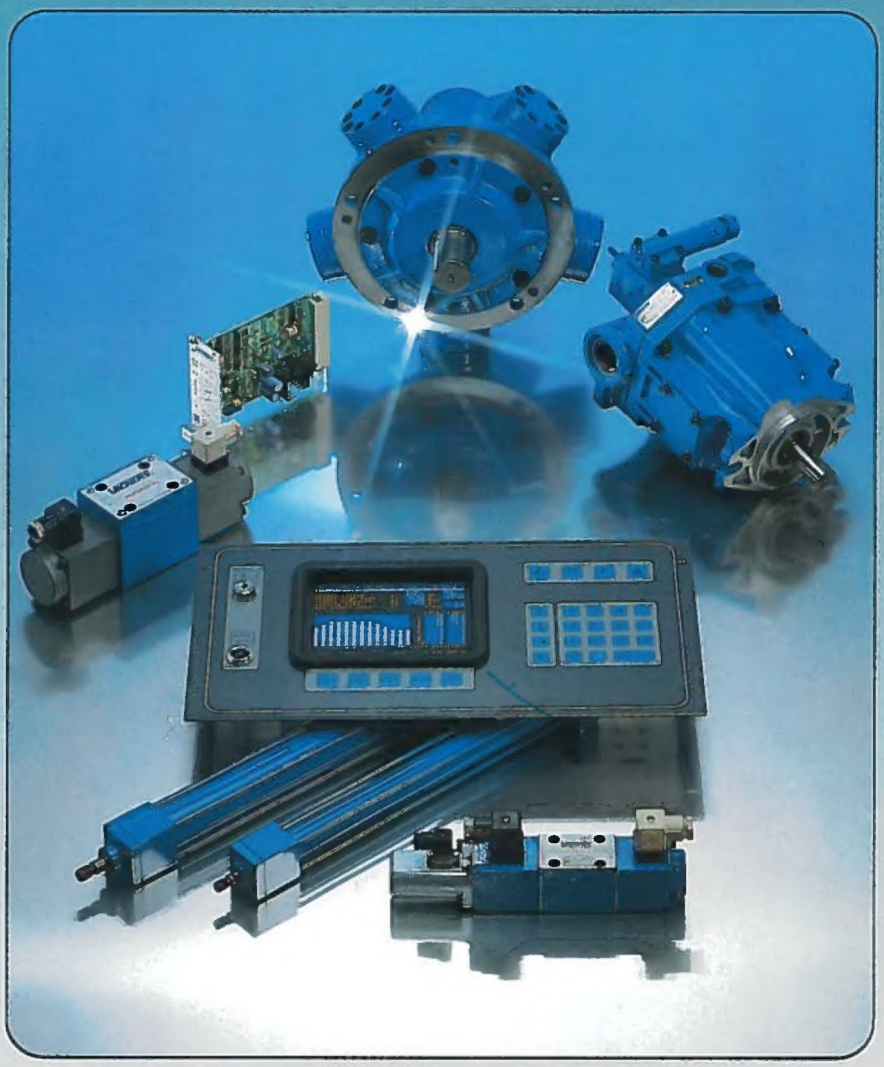
All backed by our comprehensive services. . .

- Manifold circuit designs specially geared to your hydraulic applications.
- Worldwide presence in 54 countries with technical expertise to answer your questions and provide solutions.
- Products available from all sales locations.

. . . and complemented by the Vickers product range.

- Single and multiple pumps
- Hydraulic motors and cylinders
- Pressure, flow, check and directional controls
- Proportional controls
- Electronics and microprocessor controls
- Packaged systems and components

Plus DIN 24342 slip-in cartridge valves



Advanced hydraulic plus electronic components and systems – the right choice.

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Cartridge valves

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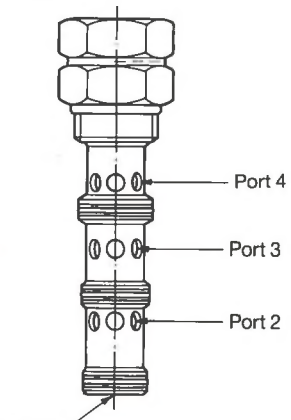
Cartridge valve function guide and index

Notes:
1. Port identities of single-cartridge forms start at the bottom, always port 1, and are numbered in ascending order according to the number of ports.
2. ■ indicates that higher pressure models can be made available; consult your local sales engineer.



4-port example

Solenoid directional controls

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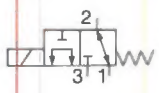
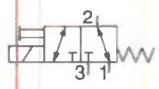
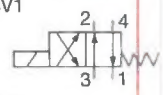
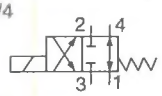
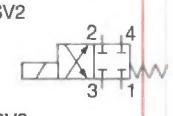
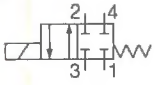
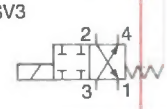
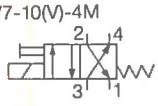
Two-way two-position (2/2) models

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
SV1/2-8(V)-C SV1/2-10(V)-C	SV1/2-8(V)-C	Poppet type	Single cartridge	23 (6)	207 (3000)	22
	SV1-10(V)-C	Poppet type	Single cartridge	45 (12)	207 (3000)	26
SV1/2-8(V)-O SV5-10(V)-O	SV2-10(V)-C	Poppet type	Single cartridge	23 (6)	207 (3000)	26
	SV1/2-8(V)-O	Poppet type	Single cartridge	23 (6)	207 (3000)	24
SV3-10(V)-C SV1-16(V)-C SV2-20(V)-C	SV5-10(V)-O	Poppet type	Single cartridge	45 (12)	207 (3000)	29
	SV3-10(V)-C	Poppet type	Single cartridge	45 (12)	207 (3000)	26
	SV1-16(V)-C	Two-stage poppet type	Single cartridge	132 (35)	207 (3000)	39
SV4-10(V)-C	SV2-20(V)-C	Two-stage poppet type	Single cartridge	227 (60)	207 (3000)	43
	SV4-10(V)-C	Spool type	Single cartridge	23 (6)	207 (3000)	26
SV3-**(V)-O	SV3-10(V)-O	Poppet type	Single cartridge	45 (12)	207 (3000)	29
	SV3-16(V)-O	Two-stage poppet type	Single cartridge	132 (35)	207 (3000)	41
SV4-10(V)-O	SV3-20(V)-O	Two-stage poppet type	Single cartridge	227 (60)	207 (3000)	45
	SV4-10(V)-O	Spool type	Single cartridge	23 (6)	207 (3000)	29

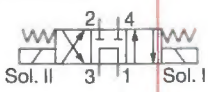
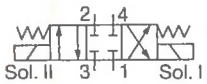
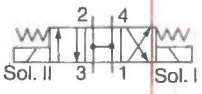
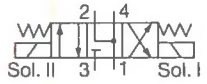
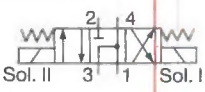
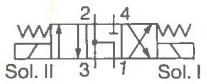
Three-way two-position (3/2) models

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
SV1 	SV1-10(V)-3	Spool type	Single cartridge	23 (6)	207 (3000)	31
SV4 	SV4-10(V)-3M	Spool type with manual override	Single cartridge	From port 1 to 2 = 19 (5) Other flow paths = 23 (6)	207 (3000)	31

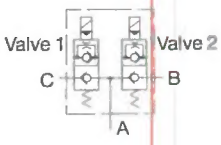
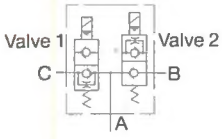
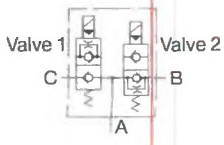
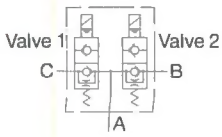
Four-way two-position (4/2) models

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
SV1  SV4  SV2  SV5  SV3  SV7-10(V)-4M 	SV1/2/3/4/5 -10(V)-4	Spool type	Single cartridge	23 (6)	207 (3000)	33
	SV7-10(V)-4M	Spool type with manual override	Single cartridge	17 (4.5)	207 (3000)	33

Four-way three-position (4/3) models

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
SV9-10(V)-A  SV9-10(V)-E  SV9-10(V)-B  SV9-10(V)-F  SV9-10(V)-D  SV9-10(V)-G 	SV9-10	Double solenoid spool type	Single cartridge	11 (3)	207 (3000)	36

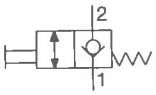
Three-way four-position (3/4) models

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
SV1-10(V)-CC3  SV1-10(V)-OC3  SV1-10(V)-CO3  SV1-10(V)-OO3 	SV1-10(V)-CC/ CO/OC/OO	Dual cartridge form	Std. valve package	45 (12)	207 (3000)	47

Solenoid coil guide

Non-solenoid directional controls

Manually operated pull-to-open directional valves, two-way two position (2/2) models

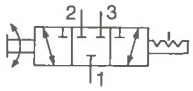
Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
	MPV1-10	Poppet type	Single cartridge	45 (12)	207 (3000)	71

Manually operated semi-rotary directional valves, three-way two-position (3/2) models

MRV3-10(V)-D2/E2 MRV3-1*(V)-K

Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
MRV3-10(V) -D2/E2	Detented, lever op.	Single cartridge	23 (6)	207 (3000)	75
MRV3-10(V)-K	Knob op.	Single cartridge	23 (6)	207 (3000)	73
MRV3-16(V)-K	Knob op.	Single cartridge	64 (17)	207 (3000)	73

Manually operated semi-rotary directional valves, three-way three-position (3/3) models



Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
MRV3-10(V) -D/E	Detented, lever op.	Single cartridge	23 (6)	207 (3000)	75
MRV3-16(V)-D	Detented, lever op.	Single cartridge	64 (17)	207 (3000)	75

Manually operated semi-rotary directional valves, four-way two-position (4/2) models

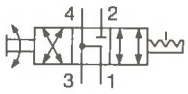
Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
MRV4-10(V)-K	Knob op.	Single cartridge	11 (3)	207 (3000)	78
MRV4-16(V)-K	Knob op.	Single cartridge	45 (12)	207 (3000)	78

Manually operated semi-rotary directional valves, four-way three-position (4/3) models

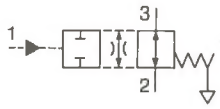
MRV4-10 MRV4-16 MRV5-10 MRV5-16

Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
MRV4/5/6-10(V) -D/E	Detented, lever op.	Single cartridge	11 (3)	207 (3000)	80
MRV4/5-16(V) -D	Detented, lever op.	Single cartridge	45 (12)	207 (3000)	80

MRV6-10



Pilot operated directional valves, two-way, two-position (2/2) series

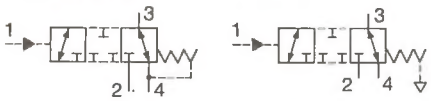


Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
PTS7-10	Ext. piloted, spring offset	Single cartridge	30 (8)	207 (3000)	60

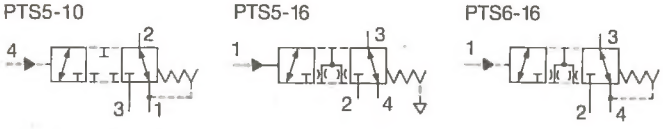
Pilot operated directional valves, three-way two-position (3/2) series

PTS1-10/16/20 PTS2-10/16/20

PTS3-10/16/20 PTS4-16

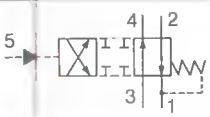


PTS5-10 PTS5-16 PTS6-16

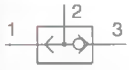


Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
PTS*-10	Ext. piloted, spring offset	Single cartridge	30 (8)	207 (3000)	52
PTS*-16	Ext. piloted, spring offset	Single cartridge	132 (35)	207 (3000)	54
PTS*-20	Ext. piloted, spring offset	Single cartridge	265 (70)	207 (3000)	56
PTS5-10	Ext. piloted, spring offset	Single cartridge	11 (3)	207 (3000)	58

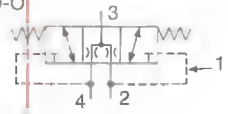
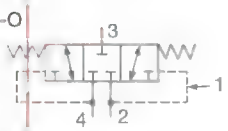
Pilot operated directional valves, four-way, two-position (4/2) series

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
	PTS6-10	Ext. piloted, spring offset	Single cartridge	23 (6)	207 (3000)	62

Shuttle valves, three-way two-position

	DSV1-10	No-spring type	Single cartridge	23 (6)	207 (3000)	64

Transmission shuttle valves, three-way three-position (3/3) series

DSV4-**(V)-O-O 	DSV4-10	Spring centered	Single cartridge	26 (7)	345 (5000)	66
	DSV4-16	Spring centered	Single cartridge	114 (30)	345 (5000)	66
DSV4-**(V)-C-O 						

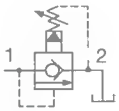
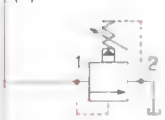
Brake release valves, four-way three-position (4/3) series

	DSV5-10	Spring centered	Single cartridge	5,5 (1.5)	207 (3000)	69

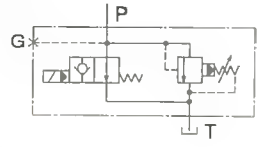
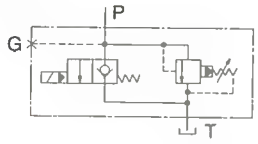
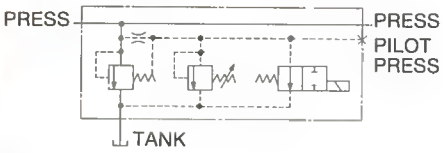
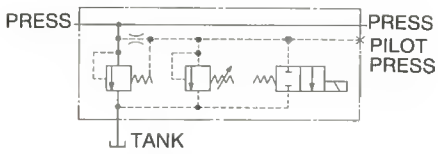
Pressure controls

Page 83

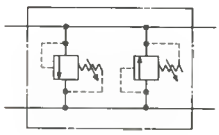
Pressure relief valves

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
RV1, RV6 and RV7  RV2 	RV1-10	Poppet type	Single cartridge	38 (10)	207 (3000)■	84
	RV2-10	Poppet type	Single cartridge	114 (30)	207 (3000)■	84
	RV3(A)-10	Poppet type	Single cartridge	76 (20)	207 (3000)■	84
	RV3-16	Poppet type	Single cartridge	303 (80)	207 (3000)■	88
RV3(A) and RV8(A) 	RV5(A)-10	Spool type	Single cartridge	114 (30)	207 (3000)■	84
	RV5-16	Spool type	Single cartridge	303 (80)	207 (3000)■	88
RV5(A) 	RV6-10	Ball type	Single cartridge	15 (4)	207 (3000)■	84
	RV7-10	Poppet type	Single cartridge	38 (10)	69 (1000)	84
	RV8(A)-10	Poppet type	Single cartridge	76 (20)	207 (3000)■	84

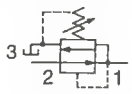
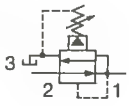
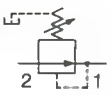
Pressure relief valves with solenoid operated bypass or venting

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
SRV2-10(V)-*-O 	SRV2-10	Double cartridge design	Std. valve package	114 (30)	207 (3000)	116
	SRV1-16	Triple cartridge design	Std. valve package	227 (60)	207 (3000)	113
SRV2-10(V)-*-C 						
SRV1-16(V)-*-O 						
SRV1-16(V)-*-C 						

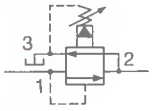
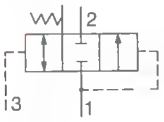
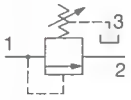
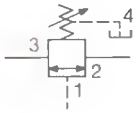
Cross-line pressure relief valves

	CRV3-10	Double cartridge design	Std. valve package	76 (20)	207 (3000)■	109
	CRV3-16	Double cartridge design	Std. valve package	303 (80)	207 (3000)■	111
	CRV5-16	Double cartridge design	Std. valve package	303 (80)	207 (3000)■	111

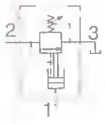
Pressure reducing valves

PRV1 	PRV1-10	Direct acting with reverse relief	Single cartridge	15 (4)	207 (3000)	91
	PRV2-10	Two-stage with reverse relief	Single cartridge	45 (12)	207 (3000)■	91
PRV2 	PRV2-16	Two-stage with reverse relief	Single cartridge	151 (40)	207 (3000)■	94
	PRV4-10	Direct acting without reverse relief	Single cartridge	15 (4)	207 (3000)	91
PRV4 						

Pressure sequence valves

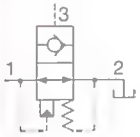
Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
PSV1/5-10  PSV1-16 	PSV1-10	Normally closed	Single cartridge	23 (6)	165 (2400)	96
	PSV1-16	Normally closed	Single cartridge	95 (25)	207 (3000)■	98
	PSV2-10	Normally closed	Single cartridge	23 (6)	165 (2400)	100
PSV2-10  PSV3-10 	PSV3-10	Normally closed	Single cartridge	23 (6)	165 (2400)	100
	PSV4-10	Normally closed	Single cartridge	15 (4)	207 (3000)■	100
PSV4-10  PSV7-10 	PSV5-10	Normally closed	Single cartridge	7,6 (2)	207 (3000)■	96
	PSV7-10	Normally closed	Single cartridge	23 (6)	124 (1800)	100
PSV8-10  PSV10-10 	PSV8-10	Normally open	Single cartridge	23 (6)	207 (3000)	103
	PSV10-10	Normally closed	Single cartridge	23 (6)	207 (3000)	103

Unloading valves



PUV3-10	Pilot-size unloader	Single cartridge	3,8 (1.0)	207(3000)	105

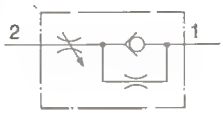
Accumulator discharge valves



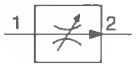
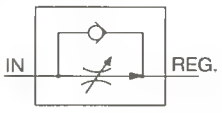
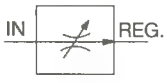
ADV1-16	Normally open. Externally piloted to close	Single cartridge	30 (8)	207 (3000)	107

Flow controls

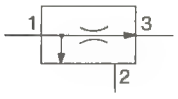
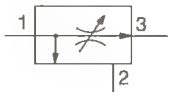
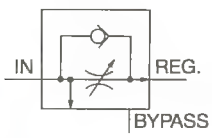
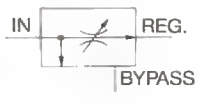
Flow restrictors, adjustable series

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
FCV6-10(V)-*-NV(F) MRV2-10/16 NV1-10 	FCV6-10	Needle type with reverse flow check option	Single cartridge	45 (12)	207 (3000)	152
	FCV6-16	Needle type	Single cartridge	208 (55)	207 (3000)	155
FCV6-10(V)-*-FF/10/20/40 	MRV2-10(V) -B/D/E/L	Semi-rotary spool, lever op.	Single cartridge	57 (15)	207 (3000)	149
	MRV2-10(V)-K	Semi-rotary spool, knob op.	Single cartridge	57 (15)	207 (3000)	146
	MRV2-16(V) -B/D/E/L	Semi-rotary spool, lever op.	Single cartridge	170 (45)	207 (3000)	149
	MRV2-16(V)-K	Semi-rotary spool, knob op.	Single cartridge	170 (45)	207 (3000)	146
NV1-16/20 	NV1-10	Needle type	Single cartridge	45 (12)	~207 (3000)	142
	NV1-16	Needle type with fixed reverse restrictor	Single cartridge	151 (40)	207 (3000)	144
	NV1-20	Needle type with fixed reverse restrictor	Single cartridge	265 (70)	207 (3000)	144

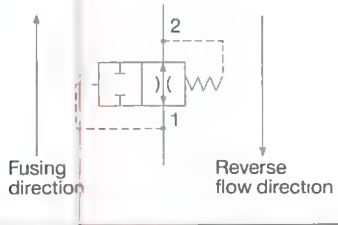
Pressure compensated flow controls, two-way series

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
FR1-10/16/20 	FR1-10	Pre-set type	Single cartridge	23 (6)	207 (3000)	120
	FR1-16	Pre-set type	Single cartridge	114 (30)	207 (3000)	120
	FR1-20	Pre-set type	Single cartridge	227 (60)	207 (3000)	120
FR2-10/16 	FR2-10	Adjustable factory-set	Single cartridge	38 (10)	207 (3000)	123
	FR2-16	Adjustable type	Single cartridge	114 (30)	207 (3000)	123
FR4-10(V)-**T-H**/S** models 	FR4-10	Adjustable type with reverse flow check option	Std. valve package	38 (10)	207 (3000)	126
All other FR4 models 	FR4-16	Adjustable type	Std. valve package	114 (30)	207 (3000)	126

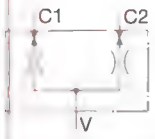
Pressure compensated priority flow controls, three-way series

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
PFR1-10/16 	PFR1-10	Pre-set type	Single cartridge	23 (6)	207 (3000)	131
	PFR1-16	Pre-set type	Single cartridge	114 (30)	207 (3000)	131
PFR2-10/16 	PFR2-10	Adjustable type	Single cartridge	38 (10)	207 (3000)	134
	PFR2-16	Adjustable type	Single cartridge	114 (30)	207 (3000)	134
PFR4-10(V)-***-H1/ H3/S1/S3 	PFR4-10	Adjustable with reverse flow check option	Std. valve package	57 (15)	207 (3000)	137
All other PFR4 models 	PFR4-16	Adjustable type	Std. valve package	151 (40)	207 (3000)	137

Velocity fuses (pipe-break valves)

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
	VF1-10	Pre-set type	Single cartridge	23 (6)	207 (3000)	157
	VF1-16	Pre-set type	Single cartridge	114 (30)	207 (3000)	157
	VF1-20	Pre-set type	Single cartridge	227 (60)	207 (3000)	157

Flow divider/combiners, pressure compensated series

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
FDC*-10/16 	FDC1-10	Standard type	Single cartridge	45 (12)	207 (3000)	160
	FDC1-16	Standard type	Single cartridge	151 (40)	207 (3000)	160
	FDC1-20	Standard type	Std. valve package	378 (100)	207 (3000)	163
FDC*-20 	FDC3-10	Transmission type	Single cartridge	45 (12)	207 (3000)	165
	FDC3-16	Transmission type	Single cartridge	227 (60)	207 (3000)	165
	FDC3-20	Transmission type	Std. valve package	378 (100)	207 (3000)	168

Check valves

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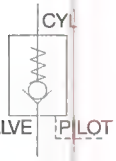
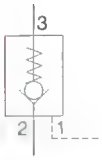
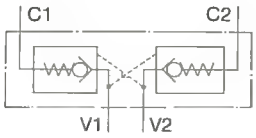
Check valves, direct-acting series

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
CV1/3-10 CV1-16 CV2-20 	CV1-10	Ball or poppet types	Single cartridge	45 (12)	207 (3000)	171
	CV1-16	Poppet type	Single cartridge	151 (40)	207 (3000)	173
	CV2-20	Poppet type	Single cartridge	227 (60)	207 (3000)	175
	CV3-10	Poppet type	Single cartridge	76 (20)	207 (3000)	171
CV5-10 	CV5-10	Poppet type	Single cartridge	45 (12)	207 (3000)	171

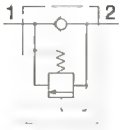
Pilot operated check valves, single pilot series

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
SPC1-10/16/20 	SPC1-10	Poppet type	Std. valve package	45 (12)	207 (3000)	181
	SPC1-16	Poppet type	Std. valve package	151 (40)	207 (3000)	183
	SPC1-20	Poppet type	Std. valve package	227 (60)	207 (3000)	185
SPC2-10/16 	SPC2-10	Poppet type	Single cartridge	23 (6)	207 (3000)	177
	SPC2-16	Poppet type	Single cartridge	114 (30)	207 (3000)	179

Pilot operated check valves, double-acting pilot series

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
	DPC1-10	Poppet type	Std. valve package	45 (12)	207 (3000)	187
	DPC1-16	Poppet type	Std. valve package	151 (40)	207 (3000)	189
	DPC1-20	Poppet type	Std. valve package	227 (60)	207 (3000)	191

Check valves, direct-acting, with thermal expansion relief function

	RV4-10	Poppet check and ball relief	Single cartridge	45 (12)	207 (3000)■	193

Proportional controls

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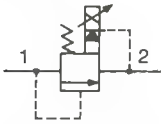
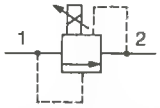
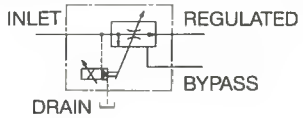
Pressure relief valves

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
ERV1-10/16  ERV2-10 	ERV1-10	Two-stage design	Single cartridge	57 (15)	207 (3000)	196
	ERV1-16	Two-stage design	Single cartridge	132 (35)	207 (3000)	196
	ERV2-10	Direct-acting design	Single cartridge	2,8 (0.75)	34,5 (500)	200

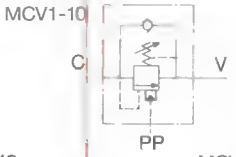
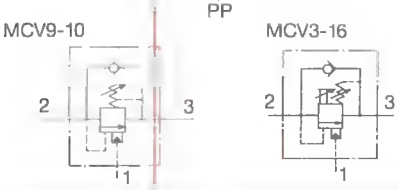
Pressure compensated flow controls, priority/bypass type

	EPFR1-10	Triple cartridge design	Std. valve package	57 (15)	207 (3000)	203
	EPFR1-16	Triple cartridge design	Std. valve package	170 (45)	207 (3000)	203

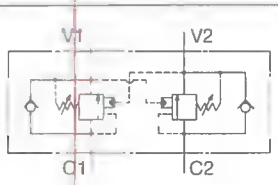
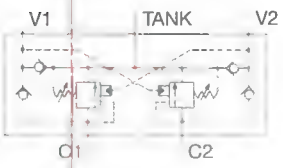
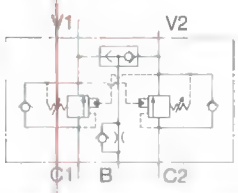
Load controls

Page 207

Counterbalance or holding valves, with reverse free-flow checks and externally piloted

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
	MCV1-10	Remotely controlled	Std. valve package	76 (20)	207 (3000)■	212
	MCV3-16	Remotely controlled with adj. opening	Single cartridge	95 (25)	345 (5000)	210
	MCV9-10	Remotely controlled	Single cartridge	15 (4)	345 (5000)	208

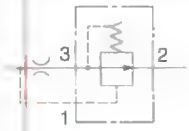
Dual counterbalance or holding valves, with reverse free-flow checks and internally piloted

MCV2 	MCV2-10	—	Std. valve package	76 (20)	207 (3000)■	215
	MCV4-10	With make-up port	Std. valve package	76 (20)	207 (3000)■	218
	MCV4-16	With make-up port	Std. valve package	151 (40)	207 (3000)■	218
MCV4 	MCV5-10	With brake-control port	Std. valve package	76 (20)	207 (3000)■	221
	MCV5-16	With brake-control port	Std. valve package	151 (40)	207 (3000)■	221
MCV5 						

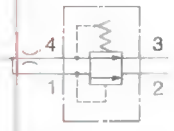
Logic elements

Page 225

Pressure compensators (hydrostats), two-way models

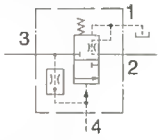
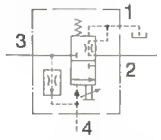
Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
	PCS3-10	Spool type	Single cartridge	38 (10)	207 (3000)	233
	PCS3-16	Spool type	Single cartridge	114 (30)	207 (3000)	233
	PCS3-20	Spool type	Single cartridge	189 (50)	207 (3000)	233

Pressure compensators (hydrostats), three-way (priority flow) models

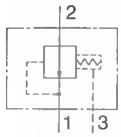
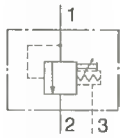
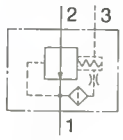
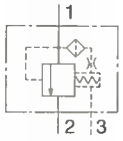
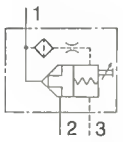
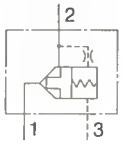
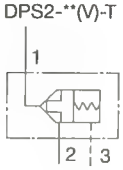
	PCS4-10	Spool type	Single cartridge	57 (15)▲	207 (3000)	236
	PCS4-16	Spool type	Single cartridge	151 (40)▲	207 (3000)	236
	PCS4-20	Spool type	Single cartridge	265 (70)▲	207 (3000)	236

▲ Input flow

Modulating orifice cartridges

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
MOS1-**(V)-F  MOS1-**(V)-M 	MOS1-10	Spool type	Single cartridge	38 (10)	207 (3000)	239
	MOS1-16	Spool type	Single cartridge	132 (35)	207 (3000)	239

Differential pressure sensing valves

Functional symbol	Model series	Features	Form	Rated flow l/min (US gpm)	Max. pressure bar (psi)	Page
DPS2-**(V)-F  DPS2-**(V)-P 	DPS2-10(V) -F/P/R/V	Spool type	Single cartridge	57 (15)	345 (5000)	242
	DPS2-10(V) -B/S/T	Poppet type	Single cartridge	57 (15)	345 (5000)	242
	DPS2-16(V) -F/P/R/V	Spool type	Single cartridge	189 (50)	345 (5000)	242
DPS2-**(V)-R  DPS2-**(V)-V 	DPS2-16(V) -B/S/T	Poppet type	Single cartridge	189 (50)	345 (5000)	242
	DPS2-20(V) -F/P/R/V	Spool type	Single cartridge	303 (80)	345 (5000)	242
	DPS2-20(V) -B/S/T	Poppet type	Single cartridge	303 (80)	345 (5000)	242
DPS2-**(V)-B  DPS2-**(V)-S 						
DPS2-**(V)-T 						

Cartridge valve alphanumeric index

Solenoid operated directional controls

An unrivalled product range comprising Vickers Modular solenoid operated screw-in cartridge valves, designed for electrical control of industrial and mobile applications.

The valves are offered with the widest choice of flow paths and position options to satisfy most requirements. These options include:

- Two-way, two-position with normally-open and normally-closed options
- Three-way, two-position
- Four-way, two-position
- Four-way, three-position
- Three-way, four-position

Solenoids
The valves in this catalog are offered with a choice of six different standard coil ratings and four types of electrical connection. Other coil ratings and connections can be supplied.

All coils are physically interchangeable and are suitable for continuous duty at rated voltage without danger of burn-out or failure.

Standard AC coils are internally rectified to supply them with DC current. This means that they have no "inrush" current values. *However, these AC coils can require protection from high-voltage surges generated in some electrical circuits* containing highly inductive or capacitive components. For more information see page 49.

Since all Vickers Modular coils are basically DC types, only the coils need be changed if converting a solenoid operated directional valve from AC to DC, or DC to AC.

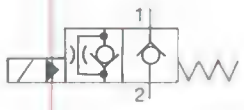
Approvals
CSA approvals are being sought for all coils listed in this catalog (see page 49).

Currently available but not cataloged here are solenoid valves with explosion-proof housings that are CSA approved, and recognized by US Underwriters Laboratories Inc. These valves are for use in mining and other hazardous environments. For further information consult your local sales engineer.

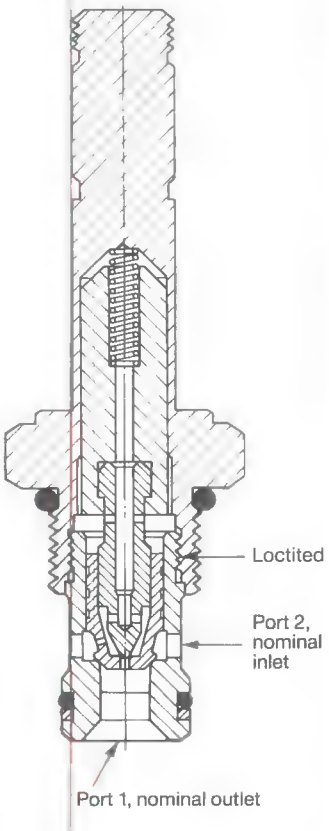
Solenoid directional valves, two-way two-position (2/2), normally-closed series

SV1/2-8(V)-C

Functional symbol



Typical section
Solenoid omitted



Model and ordering code

SV * -8(V)-C-0-** ***
1 2 3 4

1 Type
1 = To suit cavity size C1-8-2
2 = To suit cavity size C2-8-2

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Voltage rating		Amps	Lead color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

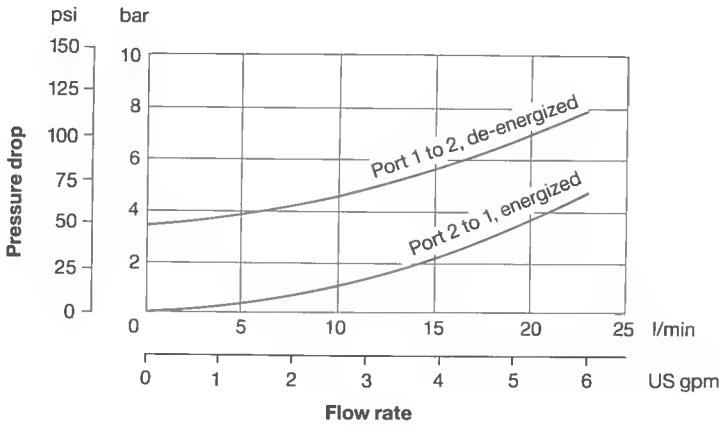
4 Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" on next page.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	23 l/min (6 US gpm)
Pressure drop characteristics	See graph on next page
Electrical characteristics and options	See 3 and 4 in "Model code" above, and page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size for: SV1-8 cartridges SV2-8 cartridges	C1-8-2 C2-8-2 For dimensions see page 247
Mass, cartridge including solenoid	0,4 kg (0.87 lb) approx.
Housing options	No standard housings available
Spare parts	See next page

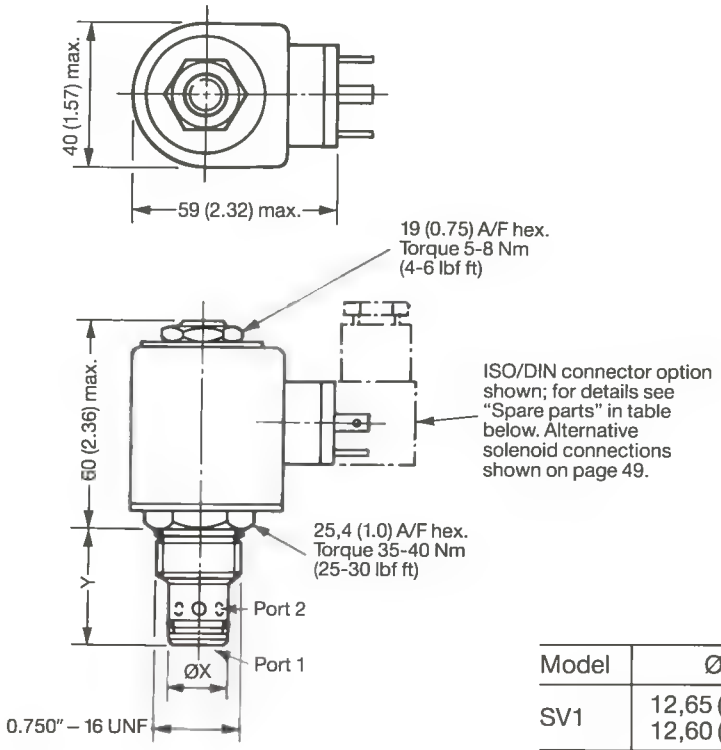
Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)

3rd angle projection



Model	ØX	Y
SV1	12,65 (0.498) 12,60 (0.496)	28,58 (1.125)
SV2	15,82 (0.623) 15,77 (0.621)	30,50 (1.202)

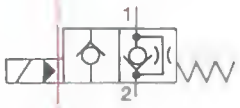
Spare parts

The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV1-8-C	SK-8-2
SV1-8V-C	SK-8V-2
SV2-8-C	SK-8-2A
SV2-8V-C	SK-8V-2A
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

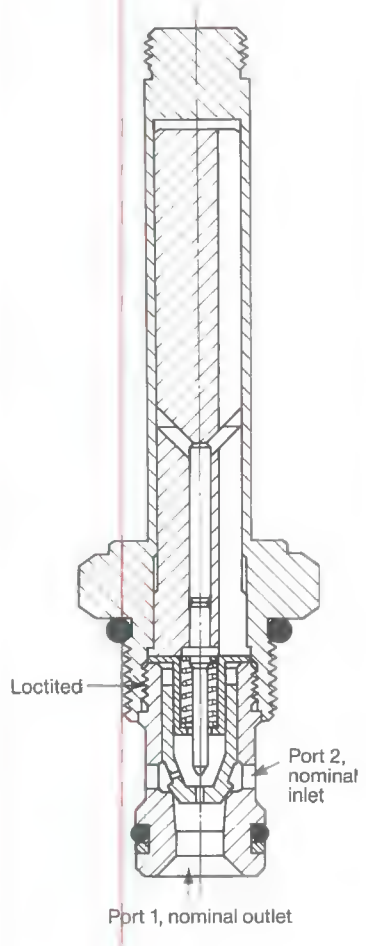
Solenoid directional valves, two-way two-position (2/2), normally-open series

SV1/2-8(V)-O

Functional symbol



Typical section
Solenoid omitted



Model and ordering code

SV* -8(V) -O- 0-**** *
[1] [2] [3 4]

[1] Type
1 = To suit cavity size C1-8-2
2 = To suit cavity size C2-8-2

[2] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[3] Voltage rating		Amps	Lead color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

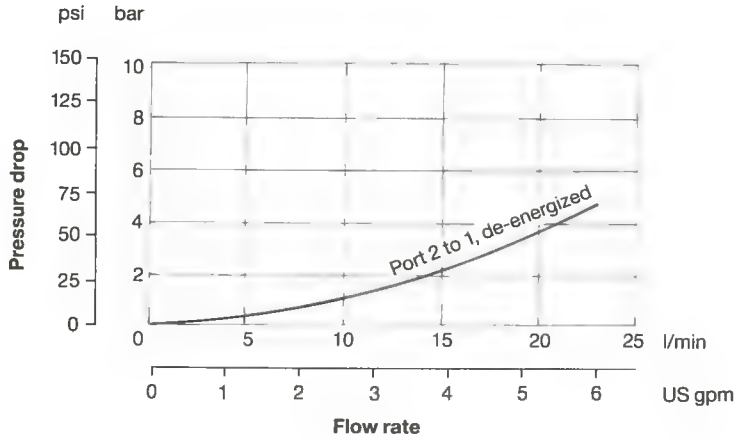
[4] Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" on next page.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	23 l/min (6 US gpm)
Pressure drop characteristics	See graph on next page
Electrical characteristics and options	See [3] and [4] in "Model code" above, and page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size for: SV1-8 cartridges SV2-8 cartridges	C1-8-2 C2-8-2 For dimensions see page 247
Mass, cartridge including solenoid	0,4 kg (0.87 lb) approx.
Housing options	No standard housings available
Spare parts	See next page

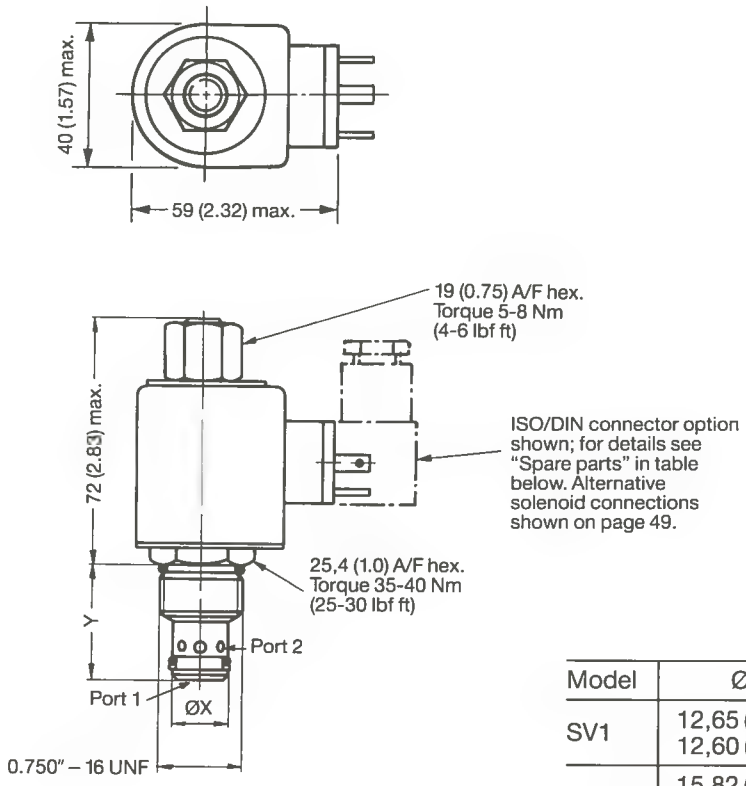
Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)

3rd angle projection



Model	ØX	Y
SV1	12,65 (0.498) 12,60 (0.496)	28,58 (1.125)
SV2	15,82 (0.623) 15,77 (0.621)	30,50 (1.202)

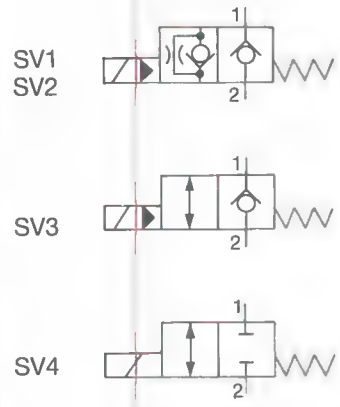
Spare parts

The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV1-8-O	SK-8-2
SV1-8V-O	SK-8V-2
SV2-8-O	SK-8-2A
SV2-8V-O	SK-8V-2A
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

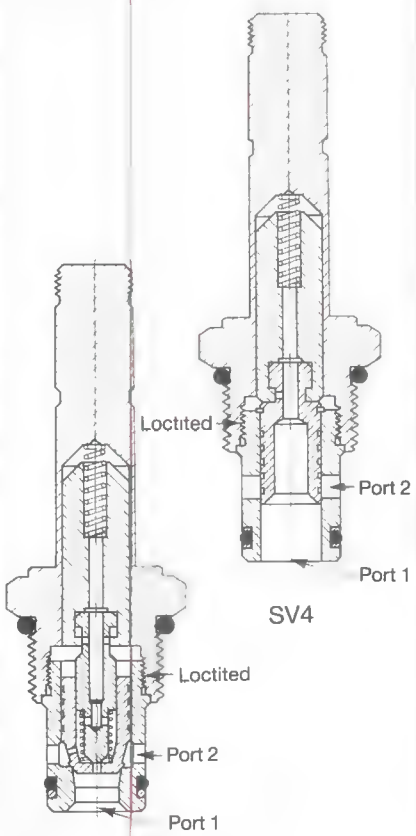
Solenoid directional valves, two-way two-position (2/2), normally-closed series

SV1/2/3/4-10(V)-C

Functional symbols



Typical sections
Solenoids omitted



SV1
Similar construction for SV2 and SV3

Model and ordering code

SV * -10(V)-C- * -** ***
1 2 3 4 5

1 Type
See also "Functional symbols" section
1 = Poppet type, two-stage, high flow
2 = Poppet type, two-stage, fast acting
3 = Poppet type, two-stage, free reverse flow
4 = Spool type, direct acting

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

Continued in next column

4 Voltage rating

		Amps	Lead color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

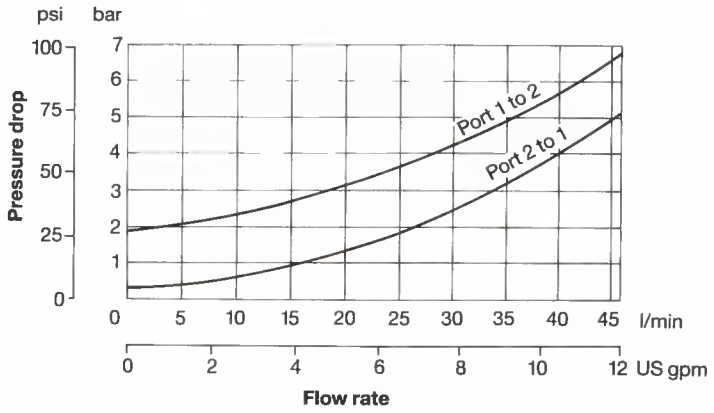
5 Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts", two pages on.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

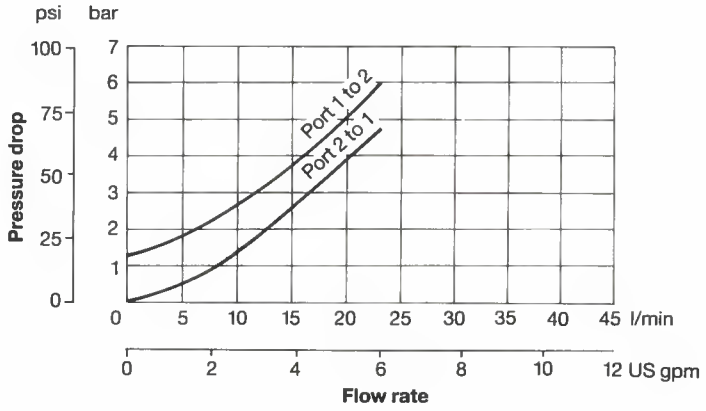
Max. pressure, both ports	207 bar (3000 psi)
Rated flow: SV1 & SV3 models SV2 & SV4 models	45 l/min (12 US gpm) 23 l/min (6 US gpm)
Pressure drop characteristics	See graphs on next page
Electrical characteristics and options	See 4 and 5 in "Model code" above, and also page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" and also page 266
Installation dimensions, cartridge only	See two pages on
Cavity size	C-10-2 See page 247 for dimensions
Mass, cartridge including solenoid	0,4 kg (0.87 lb) approx.
Housing options: Standard light duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See two pages on

Pressure drop characteristics
Cartridges only

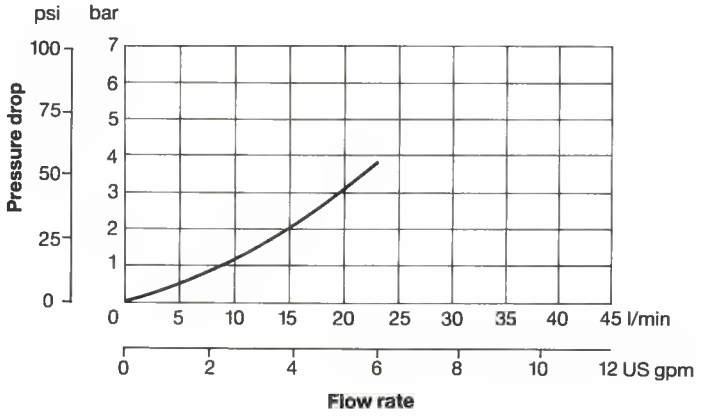
SV1 & SV3



SV2

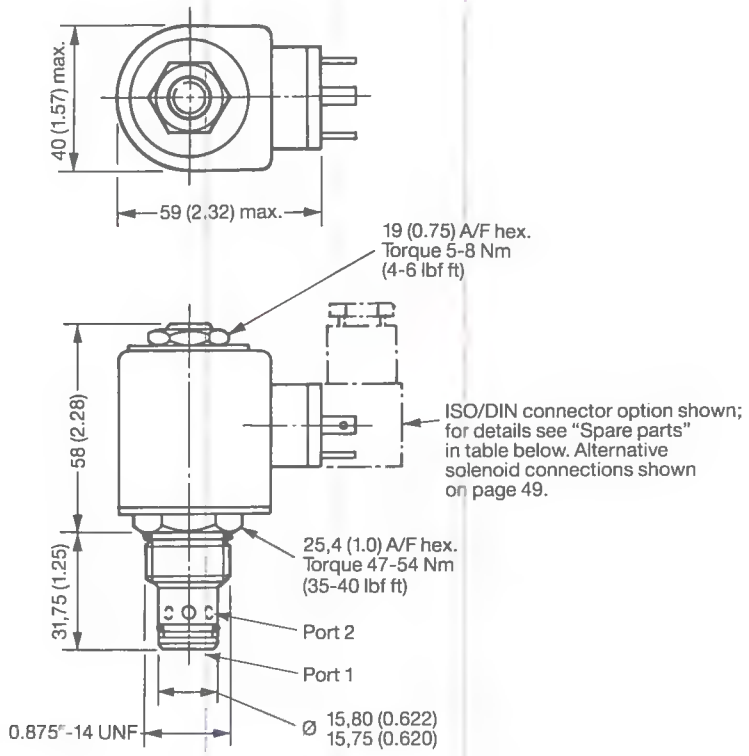


SV4



Installation dimensions in mm (inches)

3rd angle projection



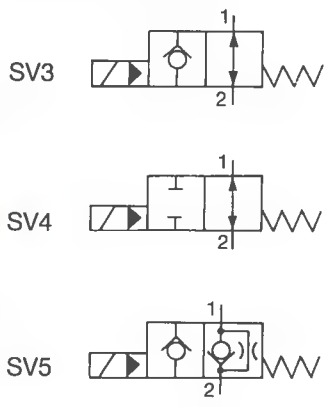
Spare parts

The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV*-10-C	SK-10-2
SV*-10V-C	SK-10V-2
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

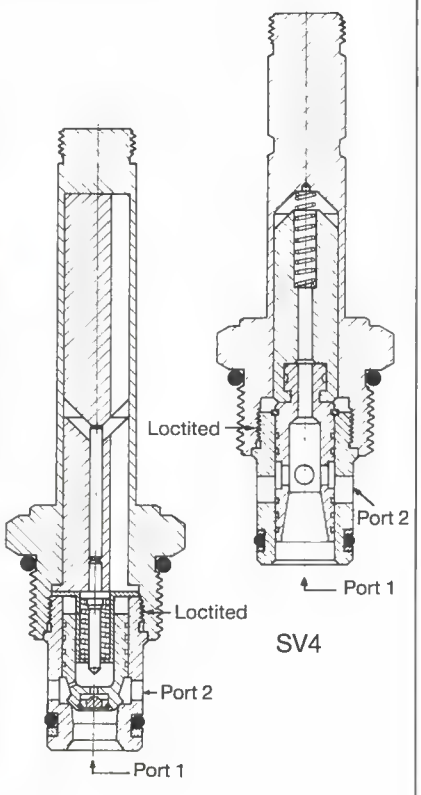
Solenoid directional valves, two-way two-position (2/2), normally-open series

SV3/4/5-10(V)-O

Functional symbols



Typical sections
Solenoids omitted



SV3
Similar construction for SV5

Model and ordering code

SV * -10(V)-O- * -** ***
[1] [2] [3] [4] [5]

[1] Type
See also "Functional symbols" section
3 = Poppet type
4 = Spool type
5 = Poppet type

[2] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[3] Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

[4] Voltage rating		Amps	Lead color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

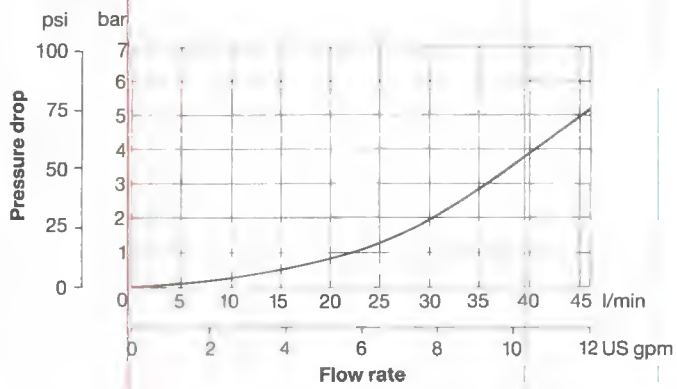
[5] Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" on next page.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

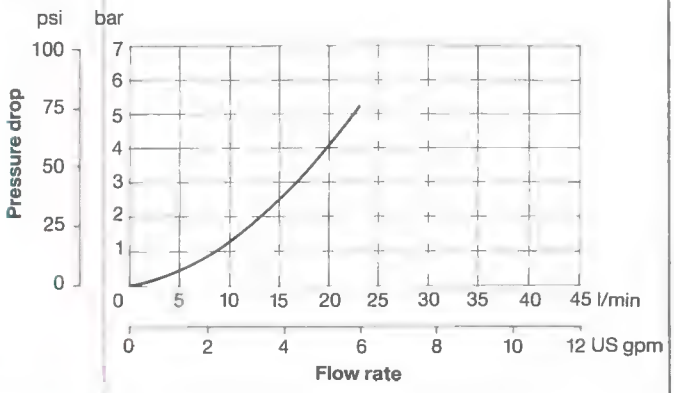
Max. pressure, both ports	207 bar (3000 psi)
Rated flow: SV3 & SV5 models SV4 models	45 l/min (12 US gpm) 23 l/min (6 US gpm)
Pressure drop characteristics	See graphs on next page
Electrical characteristics and options	See [4] and [5] in "Model code" above, and also page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-2 See page 247 for dimensions
Mass, cartridge including solenoid	0,4 kg (0.87 lb) approx.
Housing options: Standard light duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only

SV3 and SV5

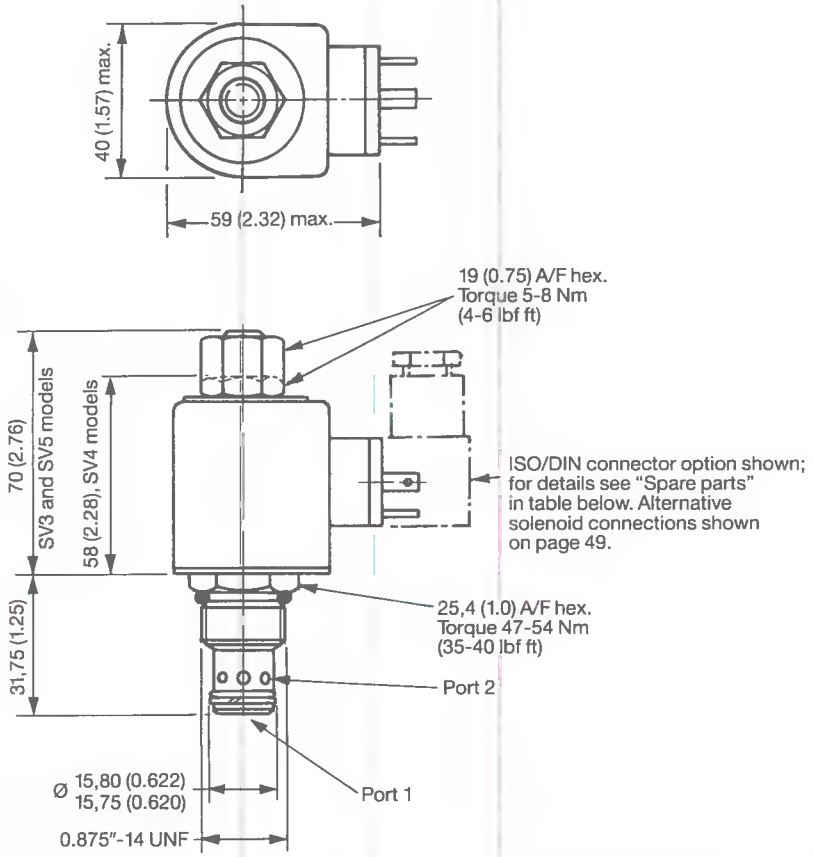


SV4



Installation dimensions in mm (inches)

3rd angle projection



Spare parts

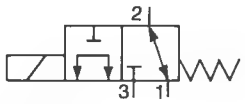
The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV3 or SV5-10-O	SK-10-2
SV3 or SV5-10V-O	SK-10V-2
SV4-10-O	SK2-10-2
SV4-10V-O	SK2-10V-2
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

Solenoid directional valves, three-way two-position (3/2) series

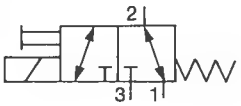
SV1-10(V)-3
SV4-10(V)-3M

Functional symbols

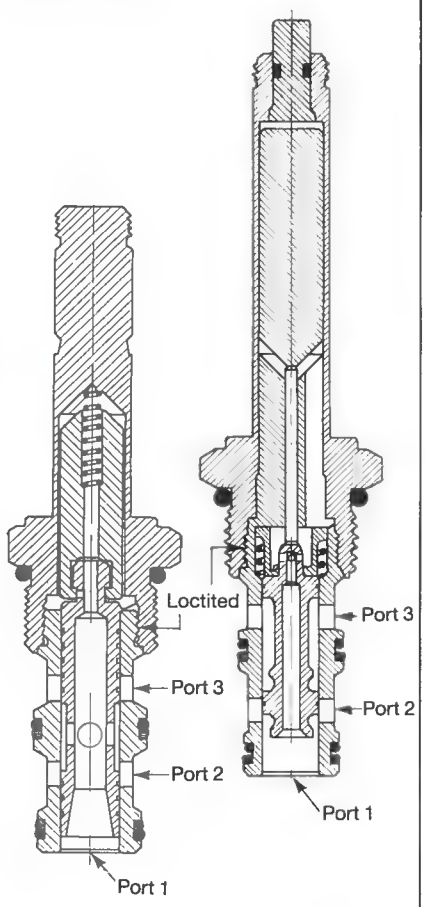
SV1-10(V)-3



SV4-10(V)-3M



Typical sections
Solenoid omitted



SV1-10(V)-3 SV4-10(V)-3M

Model and ordering code

SV * -10(V)-3 (M) --**** ***
1 2 3 4 5 6

1 Type
1 or 4. See "Typical sections" and "Functional symbols"

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Manual override option
M = Manual override, in SV4 models
Blank = No override, in SV1models

4 Form
0 = Cartridge only
In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports
In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
Continued in next column
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

5 Voltage rating

		Amps	Lead color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

6 Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" on next page.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

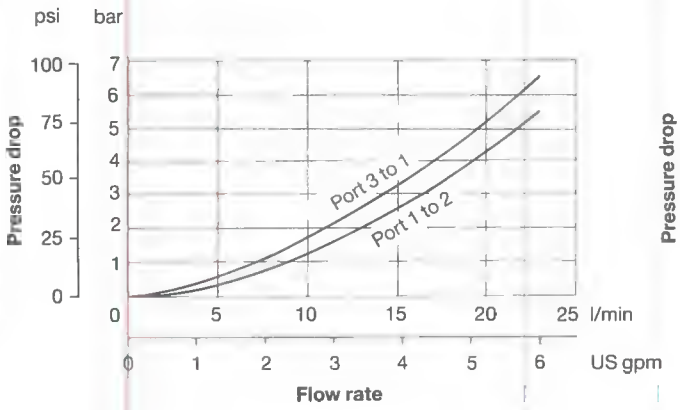
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports		207 bar (3000 psi)
Rated flow:	SV1	23 l/min (6 US gpm)
	SV4:	
	From ports 2 to 1 or 3 to 2	23 l/min (6 US gpm)
	From port 1 to 2	19 l/min (5 US gpm)
Pressure drop characteristics		See graphs on next page
Electrical characteristics and options		See 5 and 6 in "Model code" above, and also page 49
Hydraulic fluids, temperature ranges and filtration recommendations		See 2 in "Model code" and also page 266
Installation dimensions, cartridge only		See next page
Cavity size		C-10-3 See page 247 for dimensions
Mass, cartridge including solenoid		0,42 kg (0.93 lb) approx.
Housing options:		
Standard light duty type		See page 257
Standard fatigue-rated type		See page 253
Customized types		Consult your local sales engineer
Spare parts		See next page

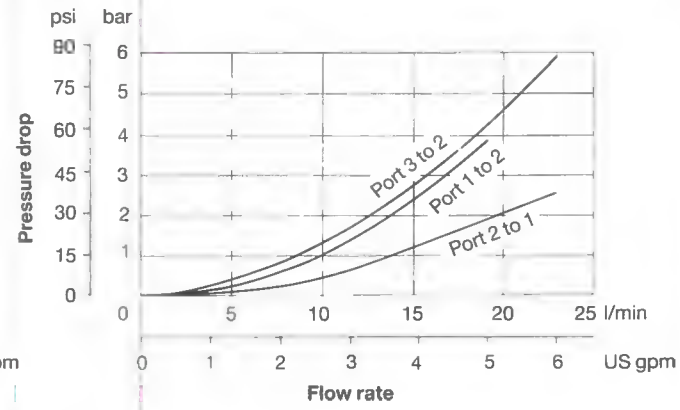
Pressure drop characteristics

Cartridges only

SV1

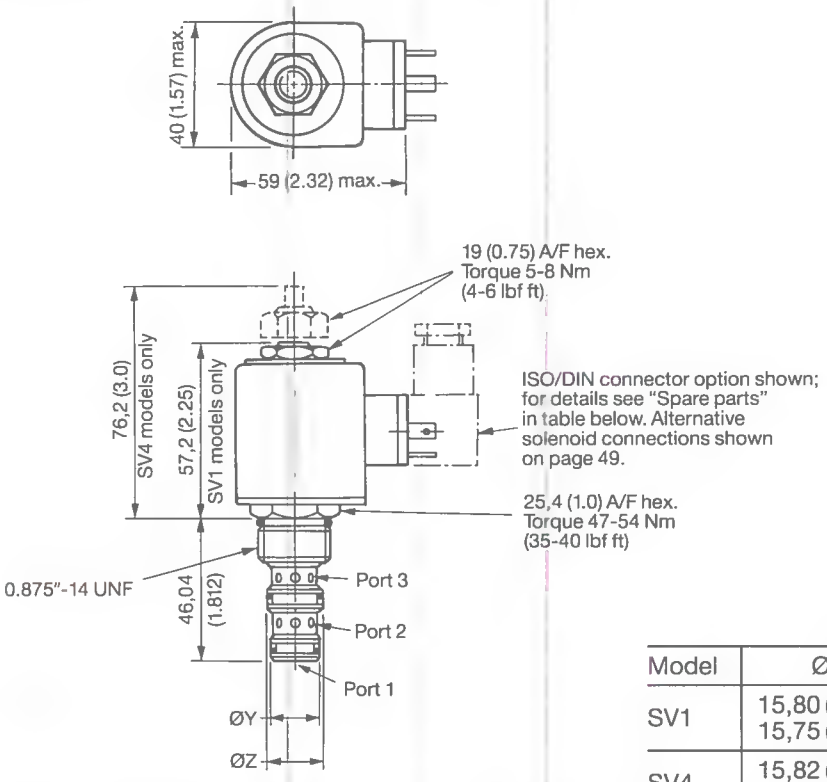


SV4



Installation dimensions in mm (inches)

3rd angle projection



Model	ØY	ØZ
SV1	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)
SV4	15,82 (0.623) 15,77 (0.621)	17,42 (0.686) 17,37 (0.684)

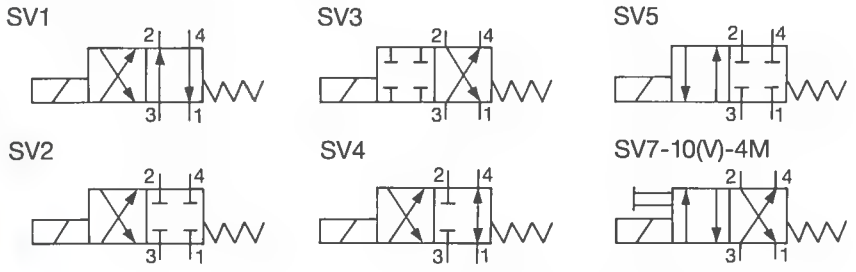
Spare parts

The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV*-10-3(M)	SK-10-3
SV*-10V-3(M)	SK-10V-3
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

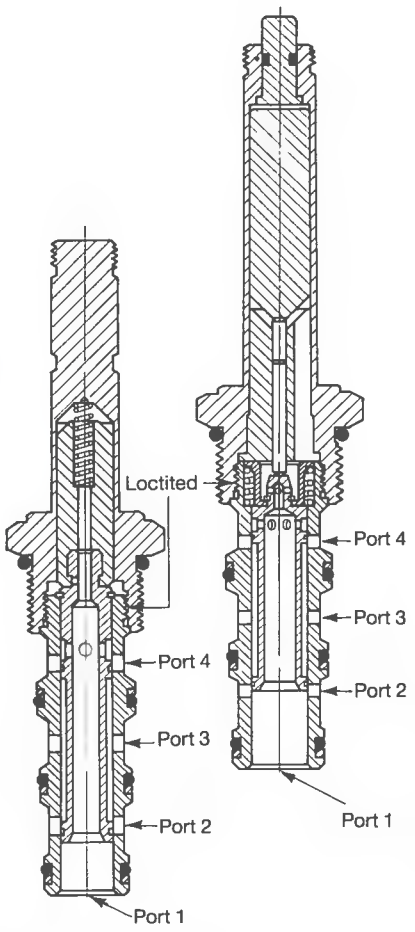
Solenoid directional valves, four-way two-position (4/2) series

SV1/2/3/4/5/7-10(V)-4(M)

Functional symbols



Typical sections
Solenoids omitted



SV1
Similar construction for SV2, SV3, SV4 and SV5 which have back-up rings on both sides of each cage O-ring.

SV7-10(V)-4M

Model and ordering code

SV * -10(V)-4(M)--**** ***
1 2 3 4 5 6

1 Type
1, 2, 3, 4, 5 or 7; see "Functional symbols" section for details

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Manual override option
M = Manual override, in SV7 models
Blank = No override, in all other models

4 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

5 Voltage rating		Amps	Lead color
00	= No coil	—	—
12D	= 12V DC	1,50	Red
24D	= 24V DC	0,75	Black
36D	= 36V DC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

6 Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts", two pages on.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

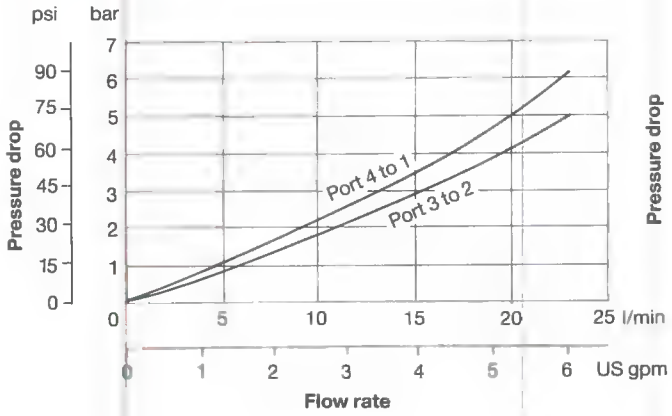
Max. pressure, all ports	207 bar (3000 psi)
Rated flow: SV7 All other models	17 l/min (4.5 US gpm) 23 l/min (6 US gpm)
Pressure drop characteristics	See graphs on next page
Electrical characteristics and options	See 5 and 6 in "Model code" above, and also page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" and also page 266
Installation dimensions, cartridge only	See two pages on

Continued on next page

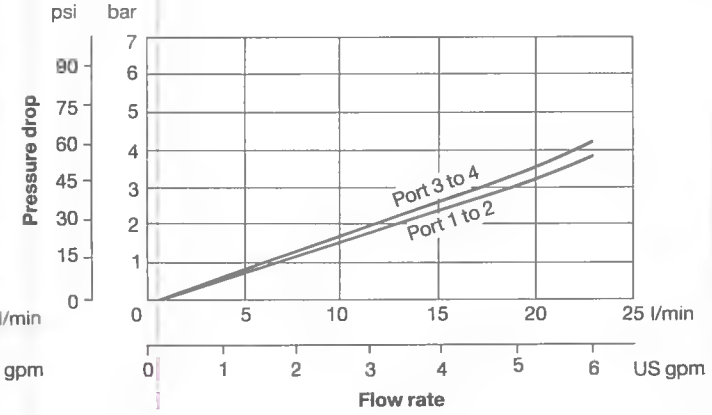
Cavity size	C-10-4. See page 247 for dimensions
Mass, cartridge including solenoid:	
SV7	0,49 kg (1.08 lb) approx.
All other models	0,44 kg (0.96 lb) approx.
Housing options:	
Standard light duty type	See page 258
Standard fatigue-rated type	See page 254
Customized types	Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only

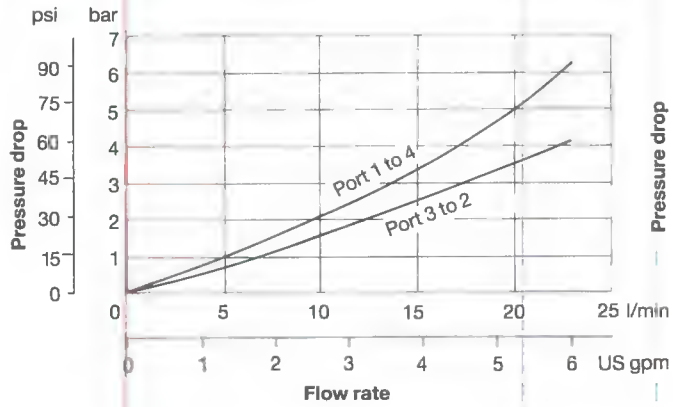
SV1



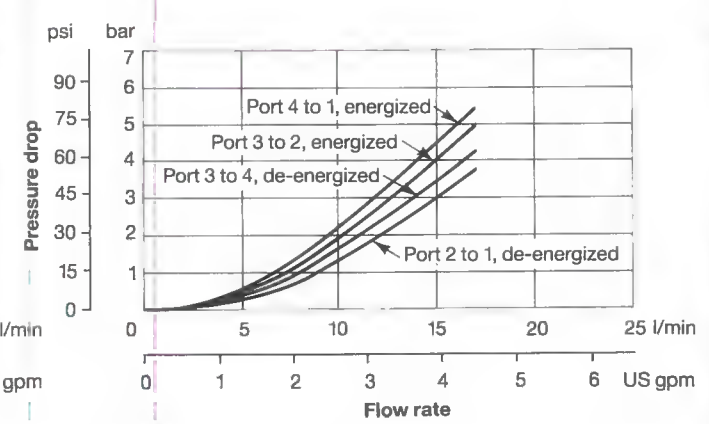
SV2, SV3 & SV4



SV5

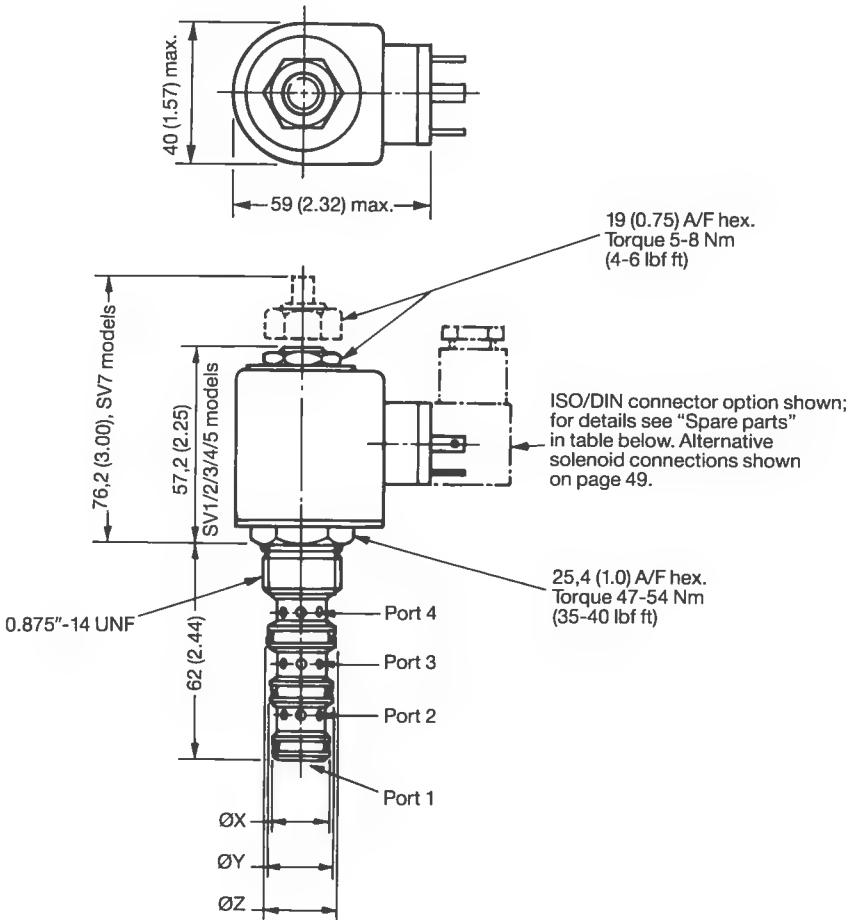


SV7



Installation dimensions in mm (inches)

3rd angle projection



Model	ØX	ØY	ØZ
SV5	15,82 (0.623) 15,80 (0.622)	17,42 (0.686) 17,40 (0.685)	19,00 (0.748) 18,97 (0.747)
All other models	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)	18,97 (0.747) 18,92 (0.745)

Spare parts

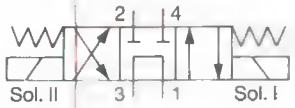
The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV1-10-4	SK-10-4
SV1-10V-4	SK-10V-4
SV2/3/4/5-10-4	SK2-10-4
SV2/3/4/5-10V-4	SK2-10V-4
SV7-10-4	SK-10-4
SV7-10V-4	SK-10V-4
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

Solenoid directional valves, four-way three-position (4/3) series

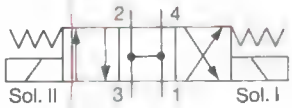
SV9-10

Functional symbols
Solenoid locations shown in "Installation dimensions" section, two pages on.

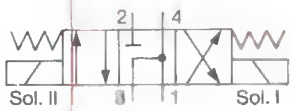
SV9-10(V)-A



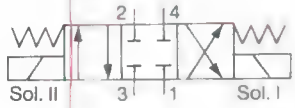
SV9-10(V)-B



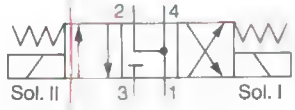
SV9-10(V)-D



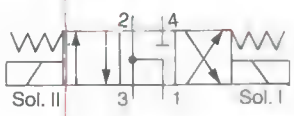
SV9-10(V)-E



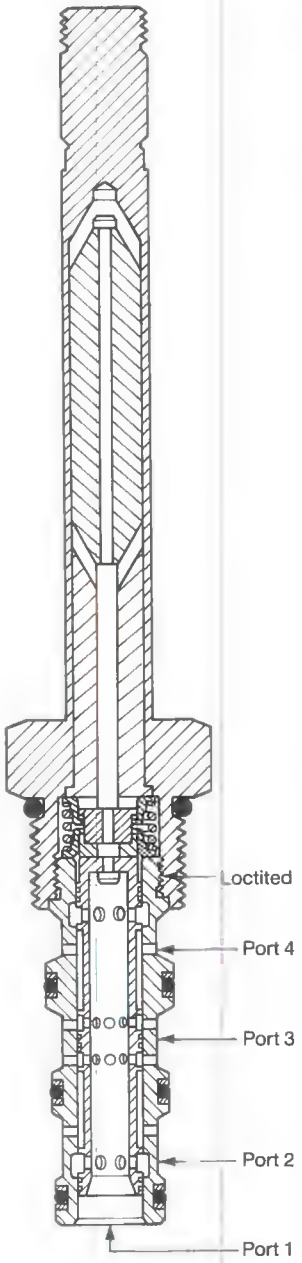
SV9-10(V)-F



SV9-10(V)-G



Typical section
Solenoids omitted



SV9-10(V)-A
Similar construction for other models

Model and ordering code

SV 9 -10(V)- * --**** ***

1 2 3 4 5

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Spool type
A, B, D, E, F & G; see "Functional symbols" section

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

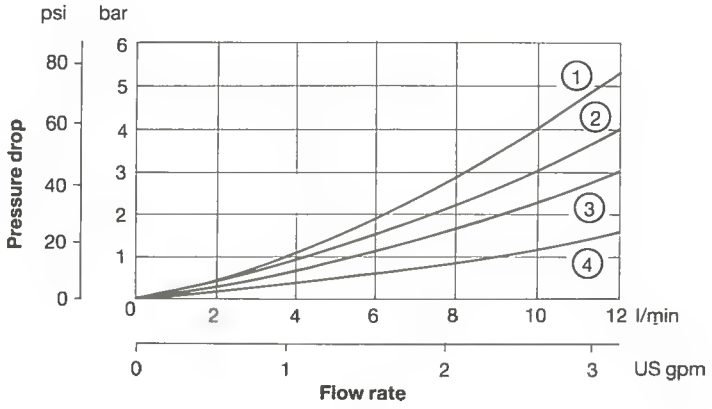
4 Voltage rating		Amps	Lead color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

5 Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plugs separately; see "Spare parts", two pages on.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)
Rated flow	11 l/min (3 US gpm)
Pressure drop characteristics	See graph below
Electrical characteristics and options	See [4] and [5] in "Model code" on previous page, and also page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-4. See page 247 for dimensions
Mass, cartridge including solenoids	0,77 kg (1.7 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 258 See page 254 Consult your local sales engineer
Spare parts	See next page

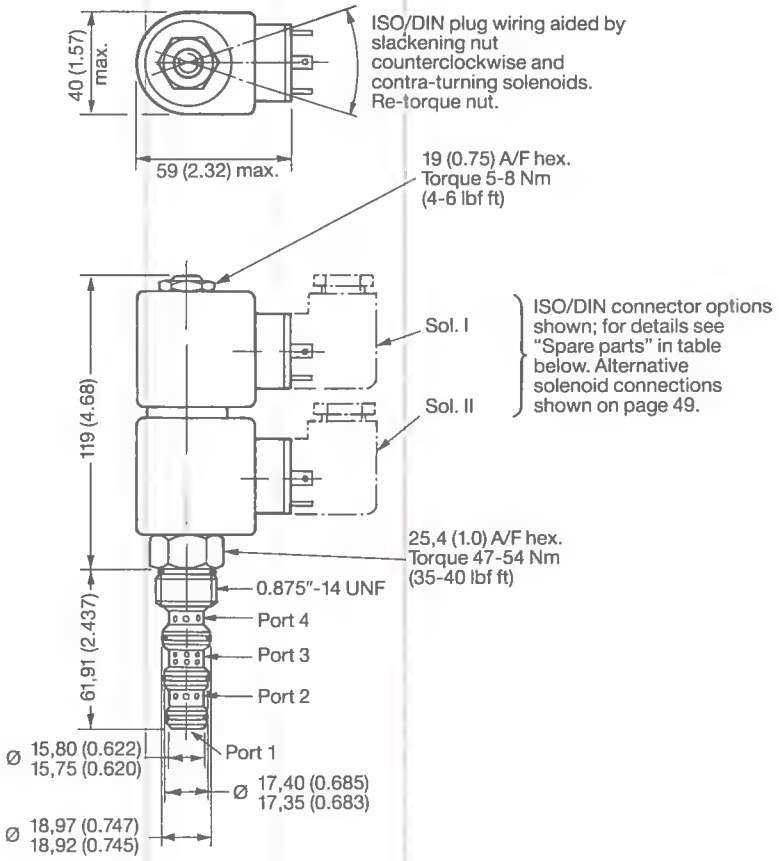
Pressure drop characteristics
Cartridges only



Curve	Spool	Flow path(s)
①	A	Port 3 to 2 or 4
②	A	Port 2 or 4 to 1
	D	Port 3 to 2
	D	Port 2 to 1
	F	Port 1 to 2 or 4
	G	Port 3 to 4
	G	Port 4 to 1
③	B	Port 3 to 2 or 4
	B	Port 2 or 4 to 1
	D	Port 3 to 4
	D	Port 4 to 1
	E	Port 3 to 2 or 4
	E	Port 2 or 4 to 1
	G	Port 3 to 2
	G	Port 2 to 1
④	A	Port 3 to 1

Installation dimensions in mm (inches)

3rd angle projection



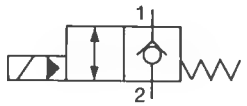
Spare parts

The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV9-10-*	SK2-10-4
SV9-10V-*	SK2-10V-4
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

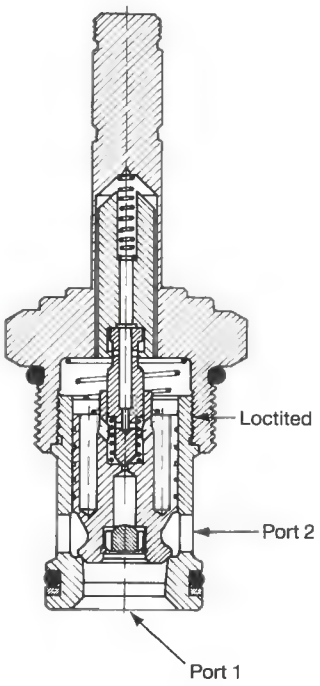
Solenoid directional valves, two-way two-position (2/2), normally-closed series

SV1-16(V)-C

Functional symbol



Typical section
Solenoid omitted



Model and ordering code

SV1-16(V)-C--**** ***

[1] [2] [3] [4]

[1] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

[3] Voltage rating

		Amps	Lead color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

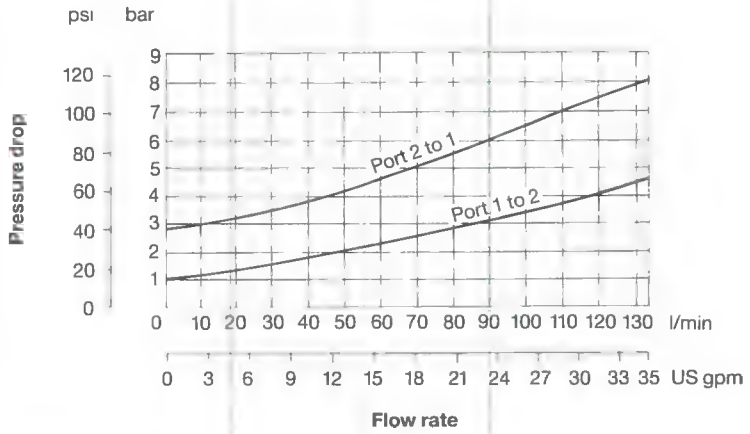
[4] Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" on next page.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	132 l/min (35 US gpm)
Pressure drop characteristics	See graph on next page
Electrical characteristics and options	See [3] and [4] in "Model code" above, and also page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-2. See page 247 for dimensions
Mass, cartridge including solenoid	1,2 kg (2.7 lb) approx.
Housing options: Standard light duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

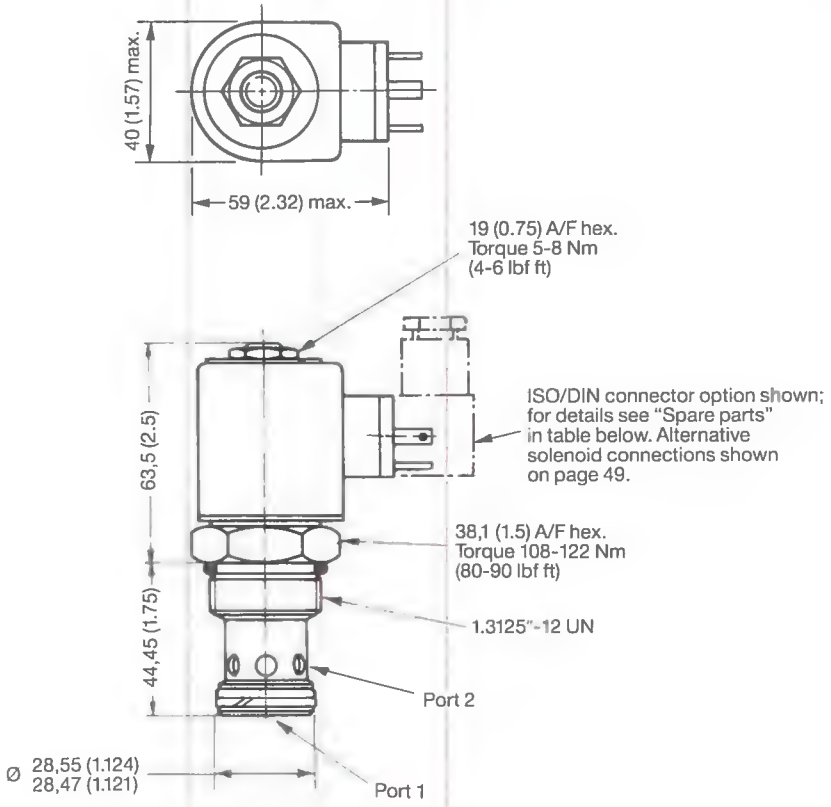
Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)

3rd angle projection



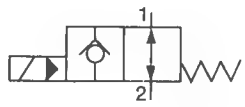
Spare parts

The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV1-16-C	SK-16-2
SV1-16V-C	SK-16V-2
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

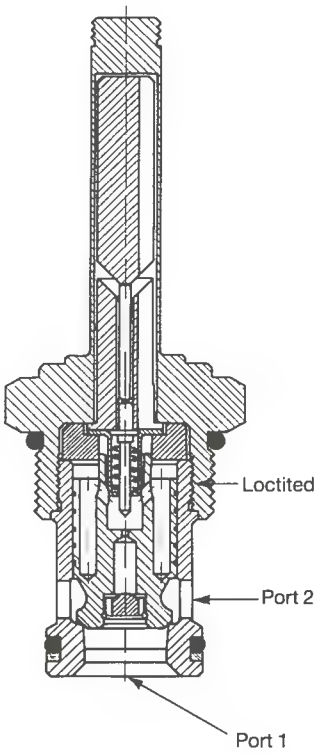
Solenoid directional valves, two-way two-position (2/2), normally-open series

SV3-16(V)-O

Functional symbol



Typical section
Solenoid omitted



Model and ordering code

SV3-16(V)-O--**** ***
[1] [2] [3] [4]

[1] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

[3] Voltage rating

		Amps	Lead color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

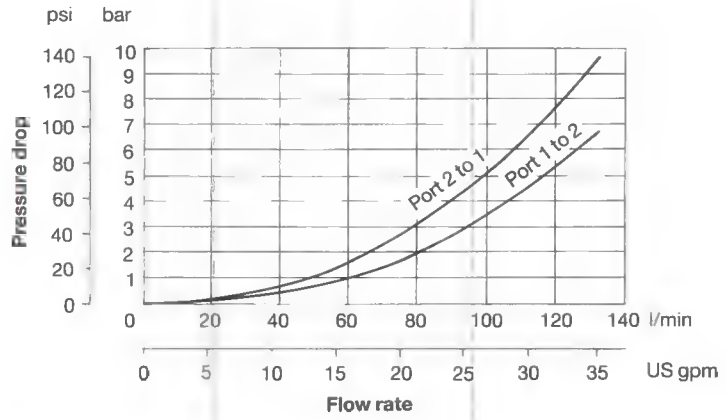
[4] Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" on next page.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	132 l/min (35 US gpm)
Pressure drop characteristics	See graph on next page
Electrical characteristics and options	See [3] and [4] in "Model code" above, and also page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-2. See page 247 for dimensions
Mass, cartridge including solenoid	0,9 kg (1.98 lb) approx.
Housing options: Standard light duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

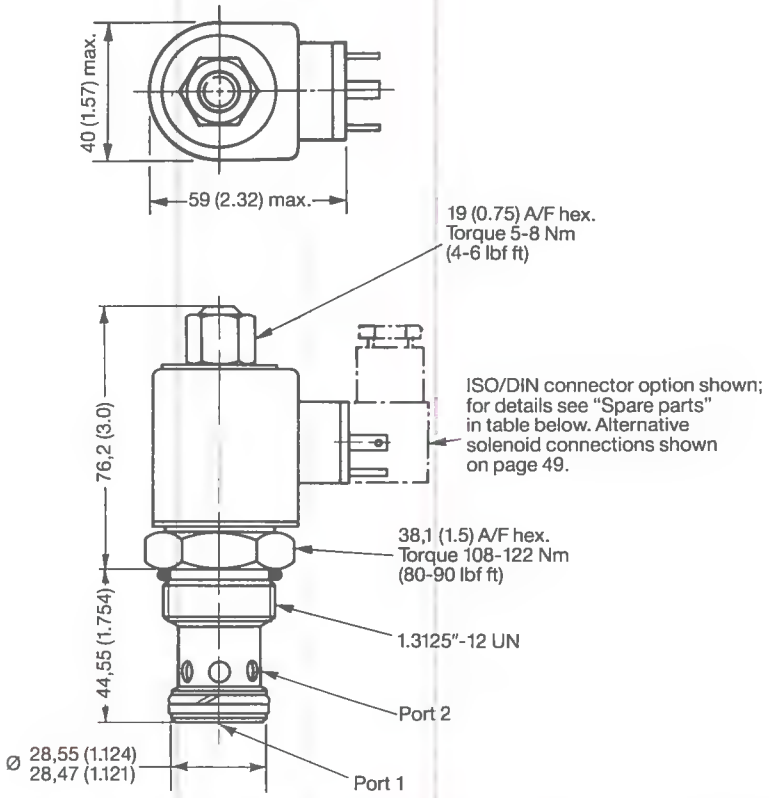
Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)

3rd angle projection



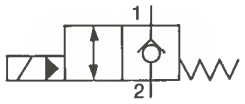
Spare parts

The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV3-16-O	SK-16-2
SV3-16V-O	SK-16V-2
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

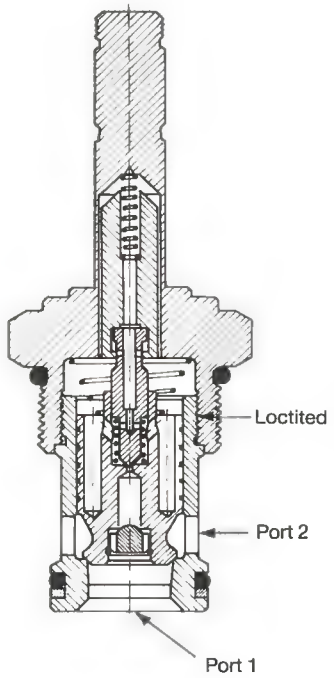
Solenoid directional valves, two-way two-position (2/2) normally-closed series

SV2-20(V)-C

Functional symbol



Typical section
Solenoid omitted



Model and ordering code

SV2-20(V)-C--**** ***
[1] [2] [3] [4]

[1] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
16T = With SAE 16 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
12H = With SAE 12 size ports
16H = With SAE 16 size ports
6G = With G¾" (BSPF) size ports
8G = With G1" (BSPF) size ports

[3] Voltage rating

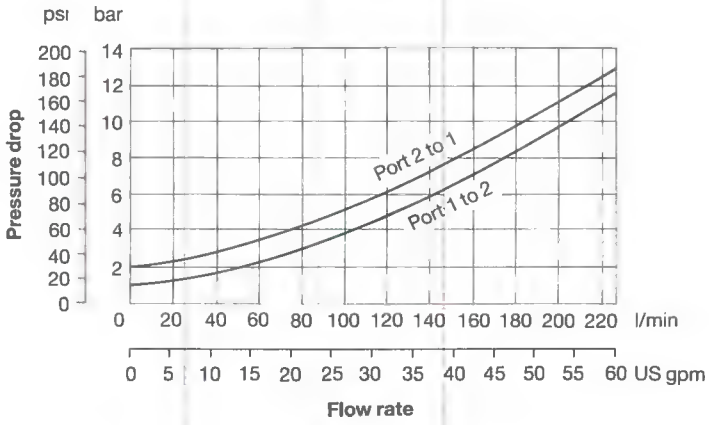
		Amps	Lead color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

[4] Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" on next page.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

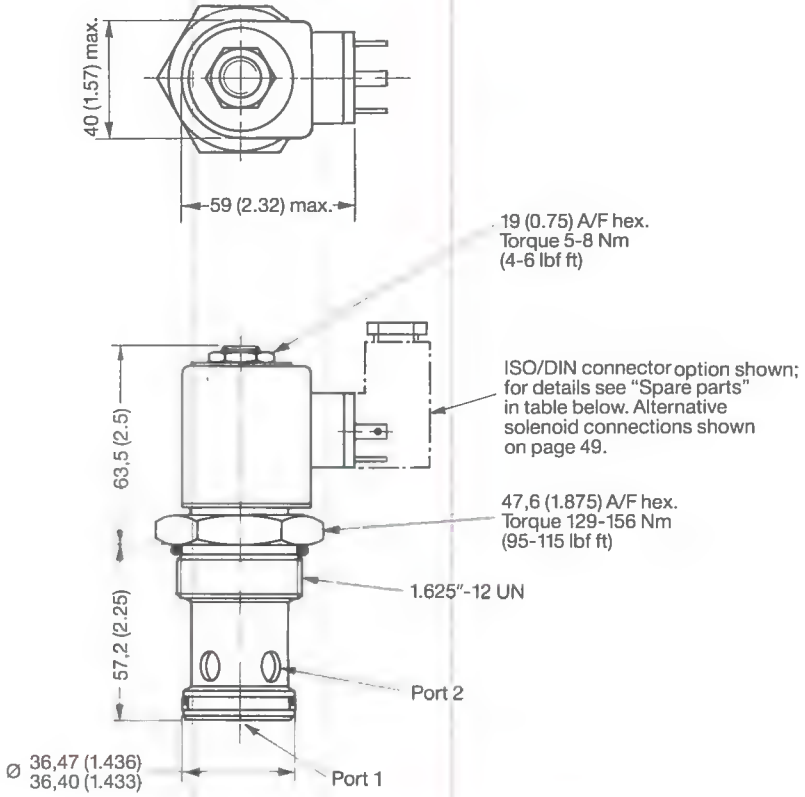
Max. pressure, both ports	207 bar (3000 psi)
Rated flow	227 l/min (60 US gpm)
Pressure drop characteristics	See graph on next page
Electrical characteristics and options	See [3] and [4] in "Model code" above, and page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-20-2. See page 247 for dimensions
Mass, cartridge including solenoid	0,88 kg (1.93 lb)
Housing options: Standard light duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only



Installation dimensions in mm (inches)

3rd angle projection



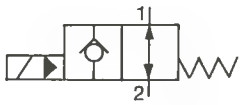
Spare parts

The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV2-20-C	SK-20-2
SV2-20V-C	SK-20V-2
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

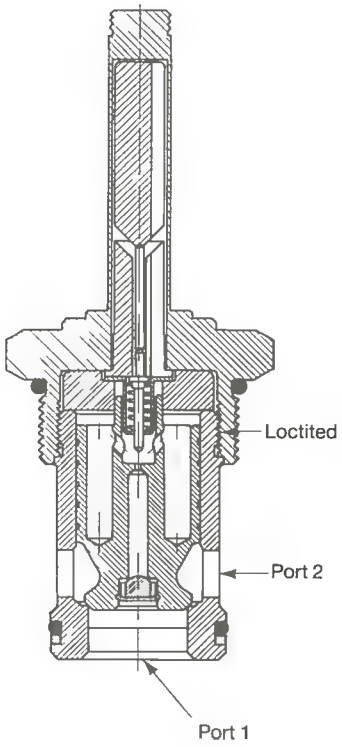
Solenoid directional valves, two-way two-position (2/2) normally-open series

SV3-20(V)-O

Functional symbol



Typical section
Solenoid omitted



Model and ordering code

SV3-20(V)-O--**** ***
[1] [2] [3] [4]

[1] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
16T = With SAE 16 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
12H = With SAE 12 size ports
16H = With SAE 16 size ports
6G = With G¾" (BSPF) size ports
8G = With G1" (BSPF) size ports

[3] Voltage rating		Amps	Lead color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

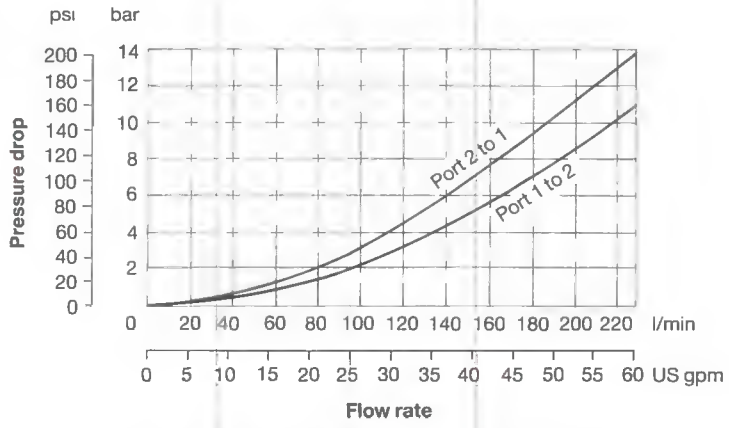
[4] Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" on next page.
P = ½" NPT conduit port, with leadwire
Q = Spade terminal (option for DC voltages only)
W = Leadwire (option for DC and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	227 l/min (60 US gpm)
Pressure drop characteristics	See graph on next page
Electrical characteristics and options	See [3] and [4] in "Model code" above, and also page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-20-2. See page 247 for dimensions
Mass, cartridge including solenoid	1,15 kg (2.53 lb) approx.
Housing options: Standard light duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

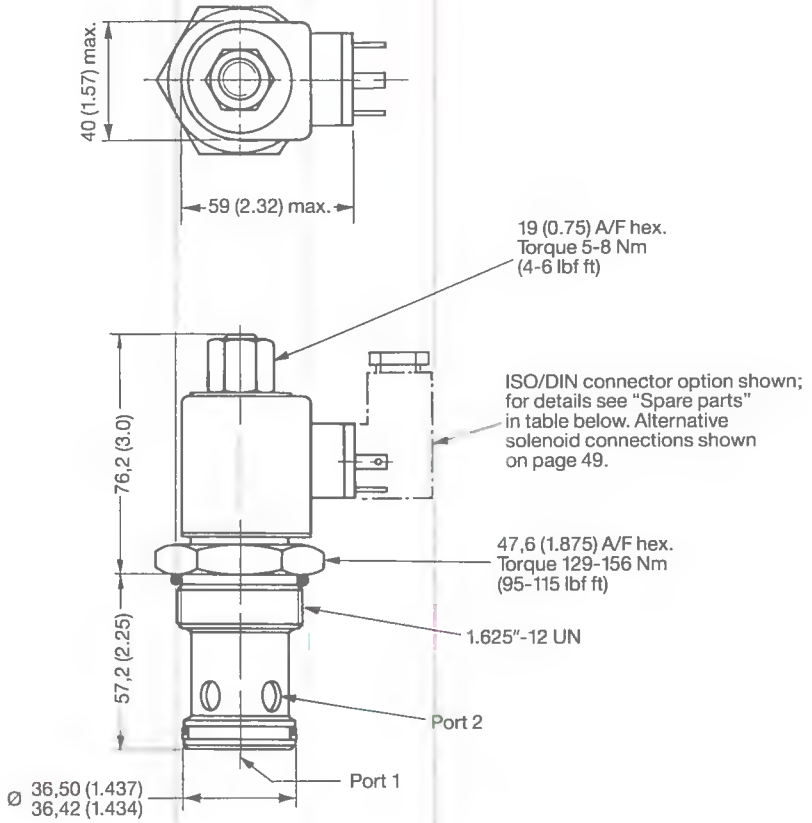
Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)

3rd angle projection



Spare parts

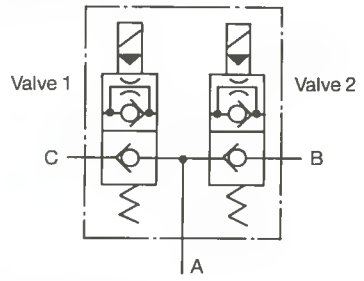
The only parts available are:	Kit no.
a. Seal kits comprising external seals and back-up rings for:	
SV3-20-O	SK-20-2
SV3-20V-O	SK-20V-2
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50

Solenoid directional valves, three-way four-position (3/4) series

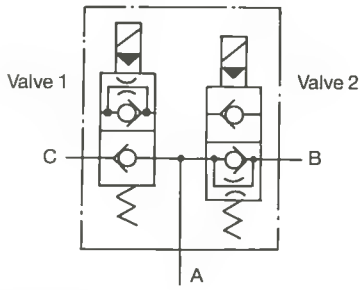
SV1-10(V)-CC, CO, OC & OO

Functional symbols

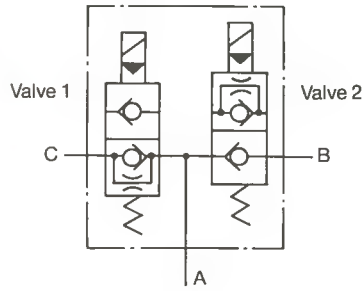
SV1-10(V)-CC3



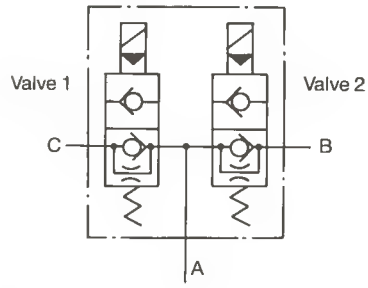
SV1-10(V)-CO3



SV1-10(V)-OC3



SV1-10(V)-OO3



Model and ordering code

SV1-10(V)- * * 3- - **** ***

1 2 3 4 5 6

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Valve 1 flow function
C = SV1-10-C type cartridge
O = SV5-10-O type cartridge

3 Valve 2 flow function
C and O options as in 2

4 Form
In light-duty housing;
207 bar (3000 psi) max.
Not NFPA fatigue-rated.
6T = With SAE 6 size ports
8T = With SAE 8 size ports
10T = With SAE 10 size ports

5 Voltage rating

		Amps	Lead■ color
00	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

6 Connector types■
Blank = No coils
G = ISO 4400 (DIN 43650) connectors. Order requisite connector plugs separately; see "Spare parts" on next page.
P = ½" NPT conduit ports
Q = Spade terminals (DC voltages only)
W = Leadwires (DC voltages and 24VAC only)

■ Standard models have both solenoids with the same characteristics.

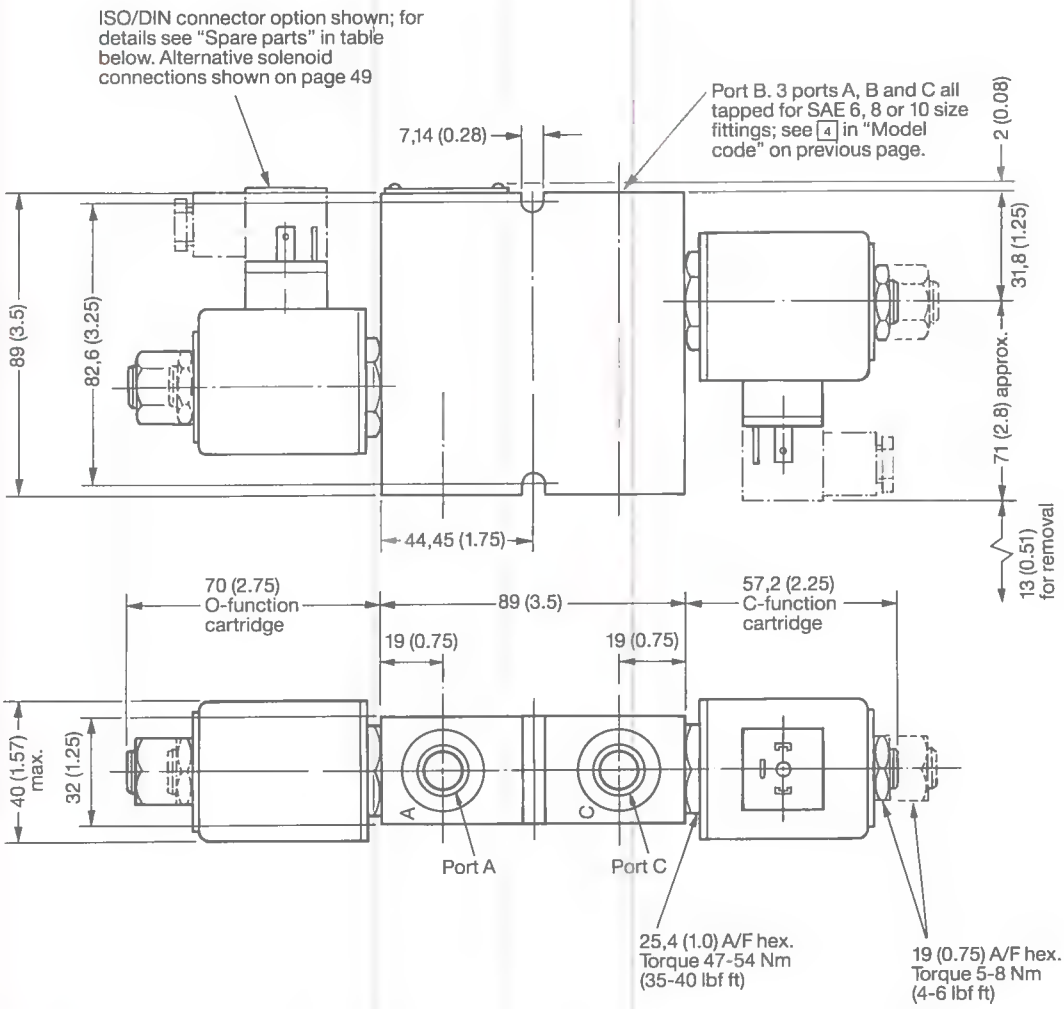
Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports. Light duty body, not NFPA fatigue-rated	207 bar (3000 psi)
Rated flow	45 l/min (12 US gpm)
Pressure drop characteristics, through cartridges: C-function cartridge O-function cartridge	 See page 26, for SV1-10(V)-C See page 29, for SV5-10(V)-O
Electrical characteristics and options	See 5 and 6 in "Model code" above, and also page 49
Hydraulic fluids, temperature ranges and filtration recommendations	See 1 in "Model code" section, and also page 266
Installation dimensions	See next page
Mass, including solenoids	1,6 kg (3.52 lb) approx.
Spare parts	See next page

Installation dimensions in mm (inches)

3rd angle projection



Spare parts

The only parts available are:

a. Seal kit comprising external seals and back-up rings for one cartridge:	Kit no.
SV*-10-*	SK-10-2
SV*-10V-*	SK-10V-2
b. Solenoid coil and ancillary parts	See page 49
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions see page 50
d. Cartridges for:	
SV1-10-**C*** or -***C** valves	SV1-10-C-0-*****
SV1-10V-**C*** or -***C** valves	SV1-10V-C-0-*****
SV1-10-**O*** or -***O** valves	SV5-10-O-0-*****
SV1-10V-**O*** or -***O** valves	SV5-10V-O-0-*****
	For -***** see 5 and 6 in "Model code" on previous page

Solenoid coil guide

General

The solenoid-operated directional valves in this catalog are offered with a choice of six different standard coil ratings and four types of electrical connection. Other coil ratings and connections can be supplied.

All coils are physically interchangeable and are suitable for continuous duty at rated voltage, without the danger of overheating or failure.

Note: When energized for long periods, the coil surface becomes hot and cannot be touched, except perhaps for an instant. However, this is an acceptable operating temperature. Excessive heating would cause smoking and a burning odor.

The operating range of standard voltage coils is +10% to –15% of rated voltage; AC coils are suitable for 50 or 60 Hz supplies. Special coils are available for battery charging circuits or battery-only operated circuits, where wide voltage ranges are encountered.

Power consumption and ampere rating can be determined from the "Model and ordering code" sections throughout pages 22 to 48 inclusive in respect to standard voltage coils. For non-standard rating coils consult your local sales engineer.

Note: Standard AC coils are internally rectified to supply them with DC current. This means that they have no "inrush" current values. However, a voltage surge suppressor may need to be installed in some circumstances, see "Protection of internally rectified AC coils" on this page.

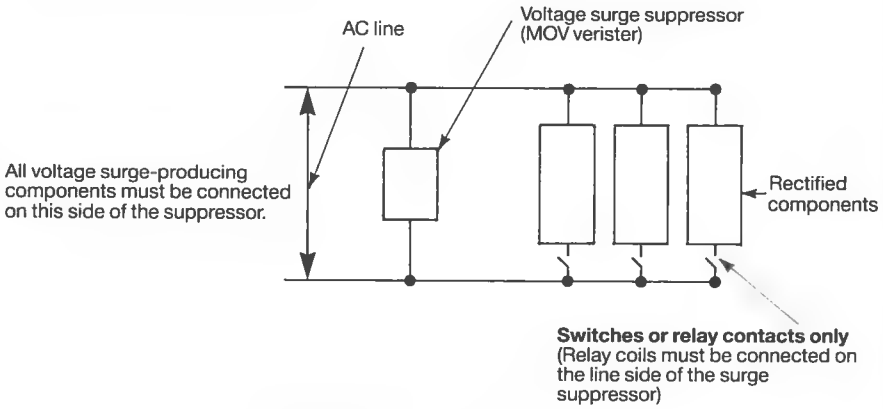
Since all Vickers Modular coil windings are DC, only the coils need be changed if converting a solenoid operated directional valve from AC to DC, or DC to AC.

Protection of internally rectified AC coils

Silicon rectifiers require protection from high voltage surges in some electrical circuits containing highly inductive or capacitive components including certain types of motors, solenoids, relays and transformers. Protection is simple and inexpensive and consists of installing a commercially available voltage surge suppressor across the AC line supplying the rectified components. The wiring diagram below illustrates the usual method. Note that a single suppressor will normally protect all of the rectified components in the circuit.

Vickers Modular AC solenoid valves use full-wave rectifiers molded into the coil assembly. When surge protection is required an MOV verister such as General Electric VL30LA20A for 115V and the VL250LA15A for 230V AC circuits should be installed.

Surge suppressor circuit



No inductive or capacitive loads can be installed between surge suppressor and rectified valves.

Approvals

CSA approvals are being sought for all coils listed in the following "Spare parts" table. Consult your local sales engineer as regards current status.

Not shown in this catalog, but available, are explosion-proof housings that are CSA approved, and recognized by the US Underwriters Laboratories Inc. These products are for use in mining and other hazardous applications.

Spare parts

Molded coils and any associated parts can be ordered by part numbers as indicated in the following table and footnotes. The corresponding MC ref. number and the voltage rating are impressed into the coil surface. Standard voltage coils are listed below.

Coil options	ISO 4400/DIN 43650 plug connection		Spade	
Code	G(a)(e)		Q(a)(c)(f)	
Voltage	Part no.	MC ref. no.	Part no.	MC ref. no.
12V DC	565553	30577	565551	30502
24V DC	565554	30580	565552	30505
36V DC	566280	30582	566281	30507
24V AC 60/50 Hz	565555	30587	566286	30510
115V AC 60 Hz/110V AC 50 Hz	565556	30588	—	—
230V AC 60/50 Hz	565557	30589	—	—

Continued on next page

Coil options	Leadwire		½" NPT conduit tapping	
Code	W ⓐ ⓑ ⓕ		P ⓐ ⓓ ⓕ	
Voltage	Part no.	MC ref. no.	Part no.	MC ref. no.
12V DC	565966	30534	566283	30545
24V DC	566250	30537	566284	30548
36V DC	566282	30539	566285	30550
24V AC 60/50 Hz	566287	30542	566288	30555
115V AC 60 Hz/110V AC 50 Hz	—	—	566289	30556
230V AC 60/50 Hz	—	—	566290	30557

ⓐ Requires nameplate part number 565560 and an appropriate nut, either:
- Part number 565559 (MC ref. number 21042) for normally-open poppet type valves, or
- Part number 565558 (MC ref. number 20082) for all other solenoid directional valves in this catalog.

ⓑ Two leads each of 61 cm (24") length, Ø1,02 mm (18 AWG) with 0,80 mm (0.031") cross-linked polyethylene insulation.

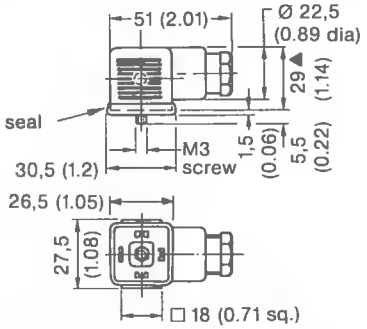
ⓒ Two 6,35 mm (0.25") wide blade terminals, to SAE J858a, spaced 12,7 mm (0.5") apart.

ⓓ Conventional ½" NPT conduit port allowing connection with Ø12,7 mm (0.5") BX cable. The coil has lead wires as per note ⓑ above.

ⓔ ISO 4400 (DIN 43650) connection. The plug(s) must be ordered separately.

Plug part numbers	710775; black, marked B 710776; gray, marked A
Cable diameter range	Ø8-10 mm (0.31-0.40")
Wire section range	0,5-1,5 mm² (0.0008-0.0023 in²)
Terminals	Screw type
Type of protection	IEC144 Class IP65, when plugs are fitted correctly to the valves with the interface seals (supplied with plugs) in place.

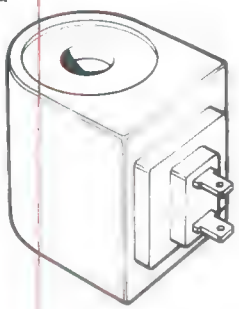
Dimensions in mm (inches)



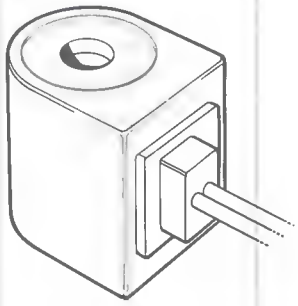
▲ May vary dependent on source.

ⓕ Configurations of alternative coil types Q, W and P.

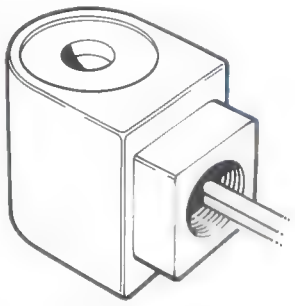
Type Q



Type W



Type P



Non-solenoid directional controls

Vickers Modular offers a full range of two-way, three-way and four-way valves operated by external pilot pressure or by a manual knob or lever control.

The combination of external piloting with either an internal drain or an atmospheric vent is ideal for creating system logic and ensuring optimum manifold designs with the wide range of flow path options available.

The contents section on page 11 provides basic information that will assist initial selection.

Additionally, numerous cartridge shuttle valves are available. These include:

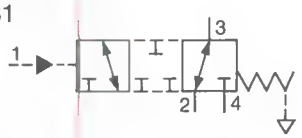
- Conventional models for selecting the source of highest pressure.
- Hydrostatic transmission shuttle valves for diverting partial flow through a cooler or filter to tank.
- Brake-selection shuttle valves for controlling brake application and release.

Pilot operated directional valves, three-way two-position series

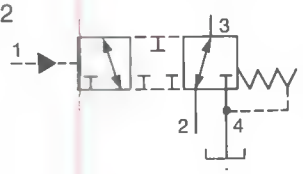
PTS1/2/3-10

Functional symbols

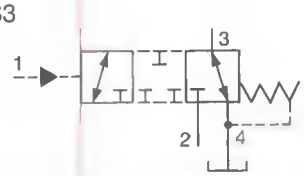
PTS1



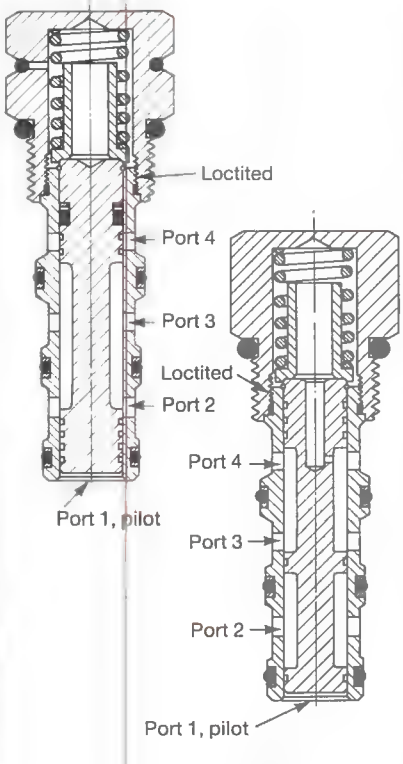
PTS2



PTS3



Typical sections



PTS1

PTS3
Similar construction for PTS2

Model and ordering code

PTS* - 10(V) - ** - ***
[1] [2] [3] [4]

[1] Type
1, 2 or 3. See "Functional symbols" section.

[2] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[3] Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

[4] Pilot pressure difference to shift, nominal
40 = 2,75 bar (40 psi)
80 = 5,5 bar (80 psi)
160 = 11,0 bar (160 psi)

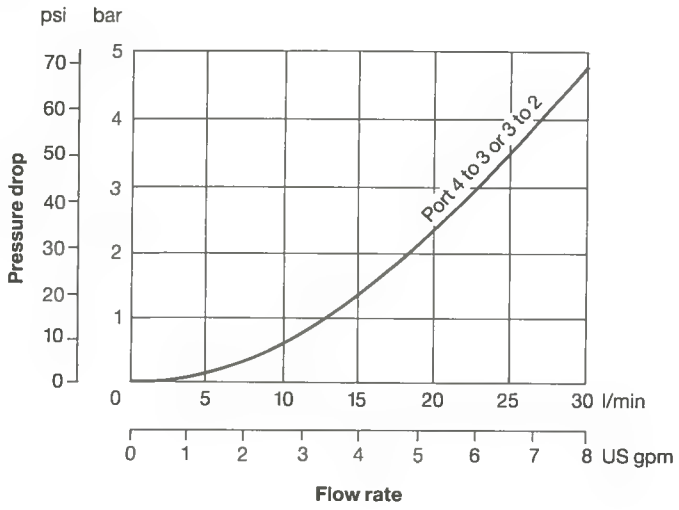
Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressures: Ports 1, 2 and 3 Port 4 of PTS1 valves Port 4 of PTS2/3 valves	 207 bar (3000 psi) 207 bar (3000 psi) 21 bar (300 psi)
Rated flow	30 l/min (8 US gpm)
Pilot pressure difference to shift	See [4] in "Model code" above
Pilot displacement volume	0,49 cm³ (0.03 in³)
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-4 For dimensions see page 247
Mass, cartridge only	0,14 kg (0.32 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 258 See page 254 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics

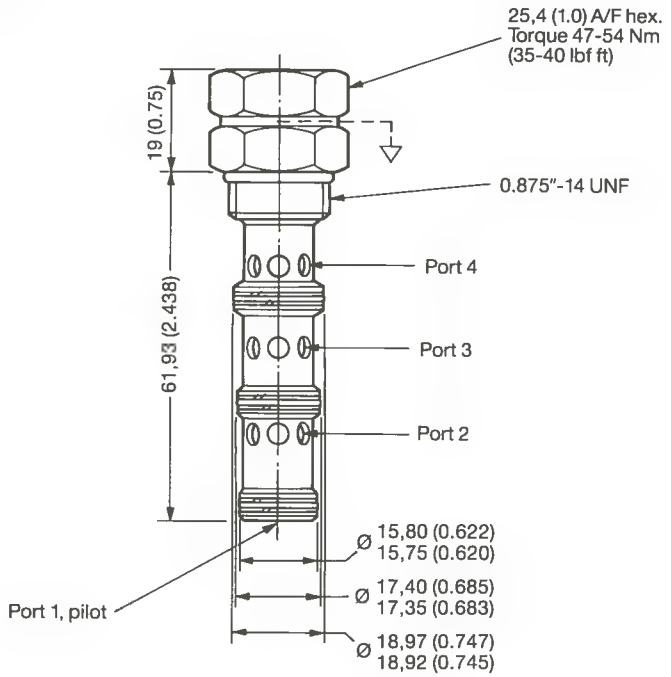
Cartridges only



Installation dimensions in mm (inches)

PTS1

PTS2/3 do not have the atmospheric drain; see "Typical sections" on previous page



Spare parts

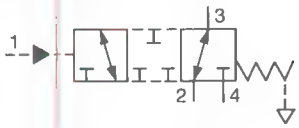
The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PTS*-10-*	SK2-10-4
PTS*-10V-*	SK2-10V-4

Pilot operated directional valves, three-way two-position series

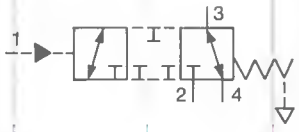
PTS1/2/3/4/5/6-16

Functional symbols

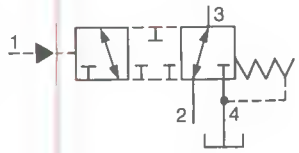
PTS1



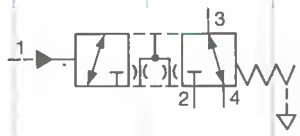
PTS4



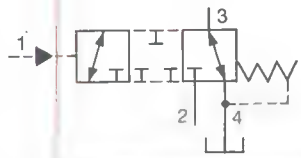
PTS2



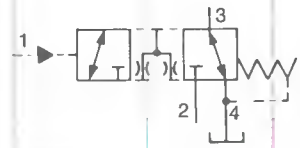
PTS5



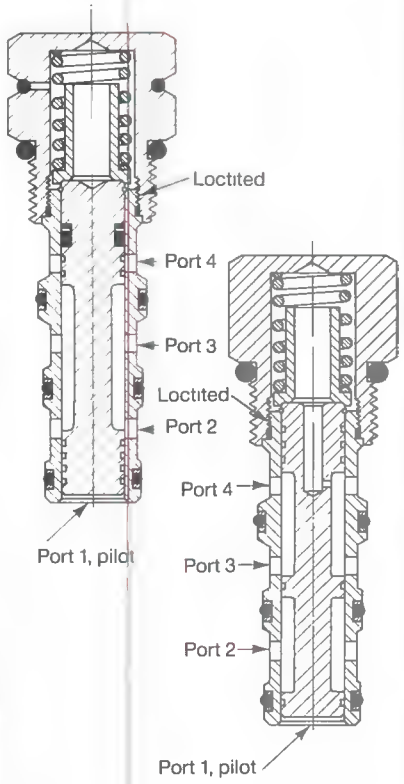
PTS3



PTS6



Typical sections



PTS1
Similar construction for PTS4 and PTS5

PTS3
Similar construction for PTS2 and PTS6

Model and ordering code

PTS*-16(V)-*-***

[1] [2] [3] [4]

[1] **Type**
1, 2, 3, 4, 5 or 6. See "Functional symbols" section

[2] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[3] **Form**
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

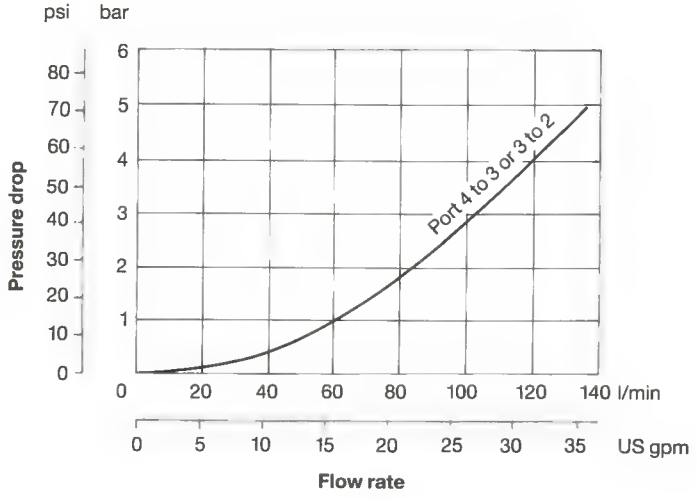
[4] **Pilot pressure difference to shift, nominal**
40 = 2,75 bar (40 psi)
80 = 5,5 bar (80 psi)
160 = 11,0 bar (160 psi)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressures: Ports 1, 2 and 3 Port 4 of PTS1/4/5 valves Port 4 of PTS2/3/6 valves	 207 bar (3000 psi) 207 bar (3000 psi) 21 bar (300 psi)
Rated flow	132 l/min (35 US gpm)
Pilot pressure difference to shift	See [4] in "Model code" above
Pilot displacement volume	1,97 cm^3 (0.12 in^3)
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-4 For dimensions see page 247
Mass, cartridge only	0,5 kg (1.12 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 258 See page 254 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics

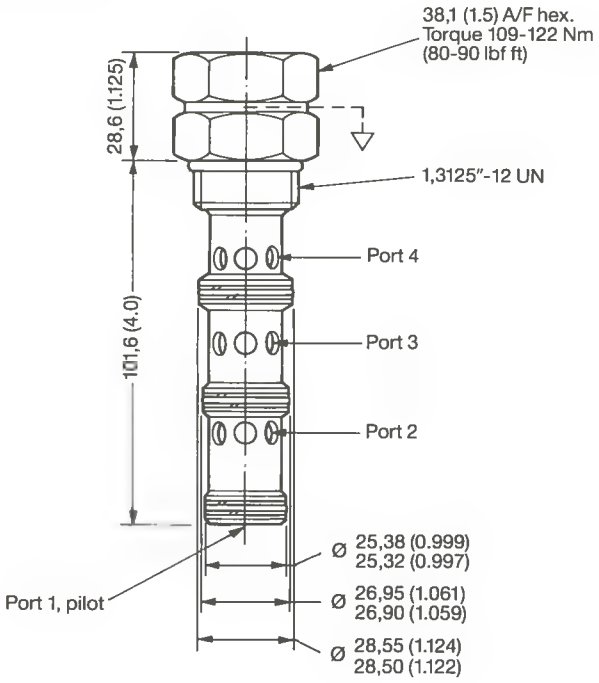
Cartridges only



Installation dimensions in mm (inches)

PTS1/4/5

PTS2/3/6 do not have the atmospheric drain;
see "Typical sections" on previous page.



Spare parts

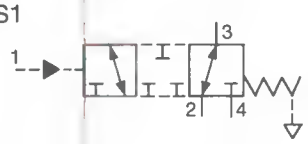
The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PTS*-16-*	SK2-16-4
PTS*-16V-*	SK2-16V-4

Pilot operated directional valves, three-way two-position series

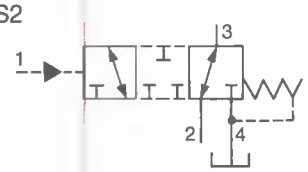
PTS1/2/3-20

Functional symbols

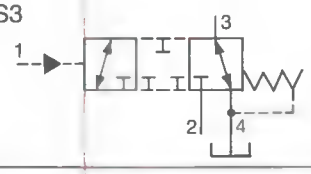
PTS1



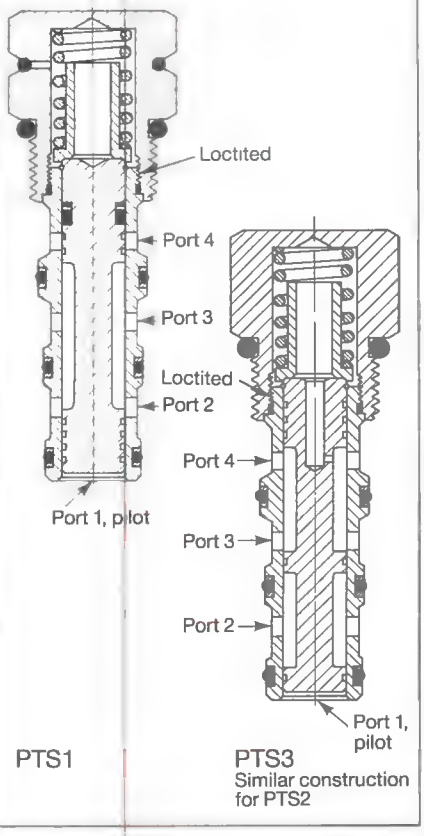
PTS2



PTS3



Typical sections



PTS1

PTS3
Similar construction for PTS2

Model and ordering code

PTS * -20(V)-* -****

[1] [2] [3] [4]

[1] **Type**
1, 2 or 3. See "Functional symbols" section

[2] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[3] **Form**
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
16T = With SAE 16 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
12H = With SAE 12 size ports
16H = With SAE 16 size ports
6G = With G¾" (BSPF) size ports
8G = With G1" (BSPF) size ports

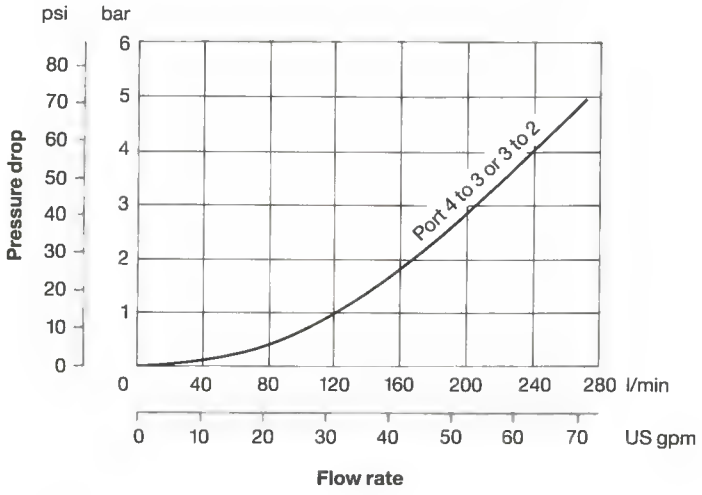
[4] **Pilot pressure difference to shift, nominal**
40 = 2,76 bar (40 psi)
80 = 5,5 bar (80 psi)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressures: Ports 1, 2 and 3 Port 4 of PTS1 valves Port 4 of PTS2/3 valves	 207 bar (3000 psi) 207 bar (3000 psi) 21 bar (300 psi)
Rated flow	265 l/min (70 US gpm)
Pilot pressure difference to shift	See [4] in "Model code" above
Pilot displacement volume	6,72 cm³ (0.41 in³)
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-20-4 For dimensions see page 247
Mass, cartridge only	1,1 kg (2.4 lb)
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 258 See page 254 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics

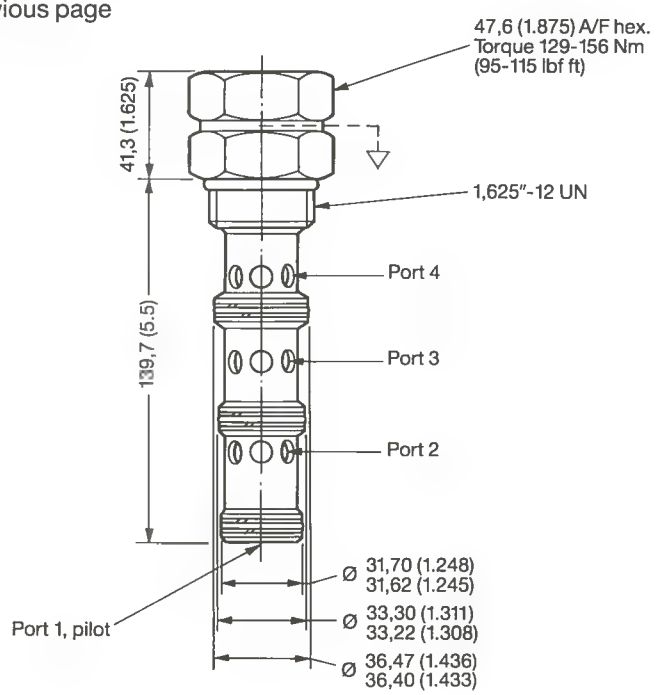
Cartridges only



Installation dimensions in mm (inches)

PTS1

PTS2/3 do not have the atmospheric drain; see "Typical sections" on previous page



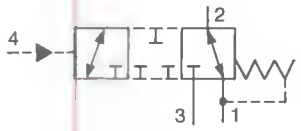
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PTS*-20-*	SK2-20-4
PTS*-20V-*	SK2-20V-4

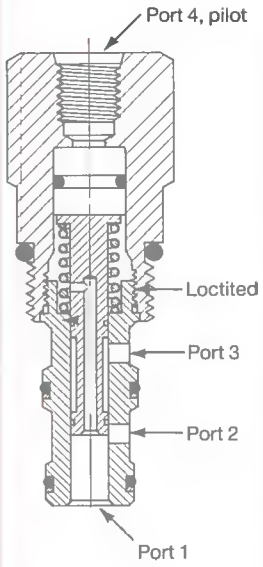
Pilot operated directional valves, three-way two-position series, with external pilot connection

PTS5-10

Functional symbol



Typical section



Model and ordering code

PTS5-10(V) - ** - 50
[1] [2]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Form**
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

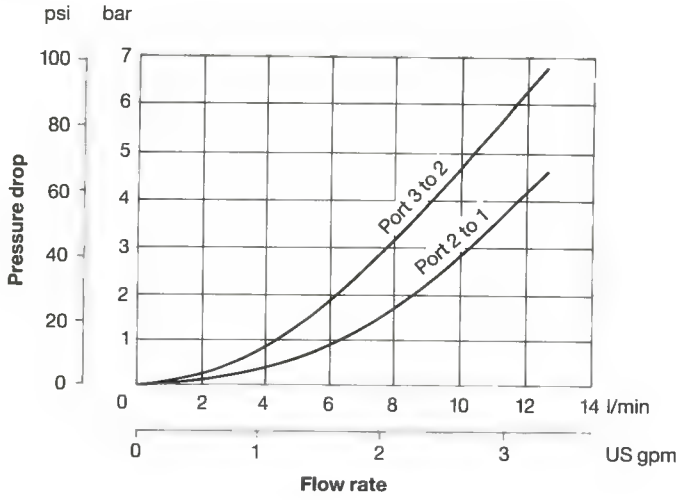
In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

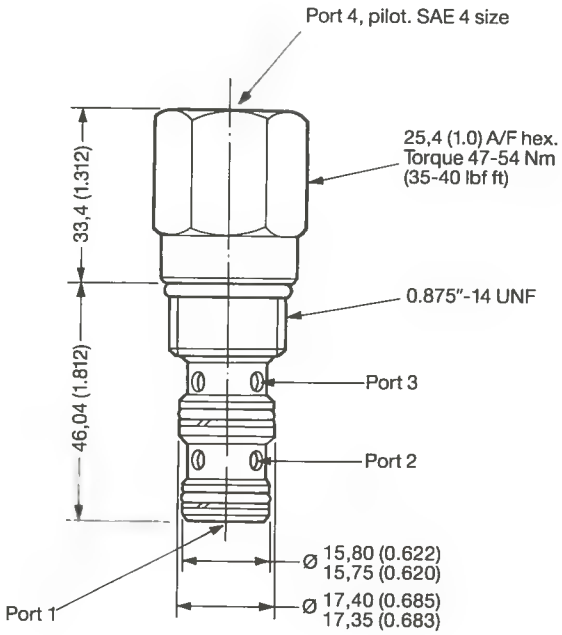
Max. pressure, all ports	207 bar (3000 psi)
Rated flow	11 l/min (3 US gpm)
Pilot pressure difference to shift	3,45 bar (50 psi) nominal
Pilot displacement volume	0,49 cm³ (0.03 in³)
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-3 For dimensions see page 247
Mass, cartridge only	0,15 kg (0.33 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 257 See page 253 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)



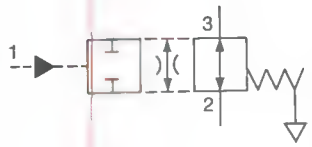
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PTS5-10-*	SK2-10-3
PTS5-10V-*	SK2-10V-3

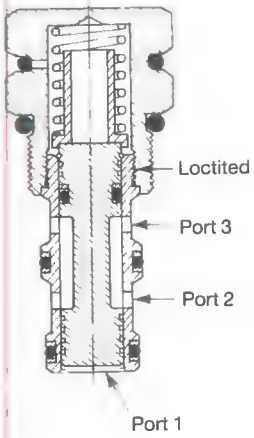
Pilot operated directional valves, two-way two-position series

PTS7-10

Functional symbol



Typical section



Model and ordering code

PTS7-10(V) - ** - *
1 2 3**

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports
Continued in next column

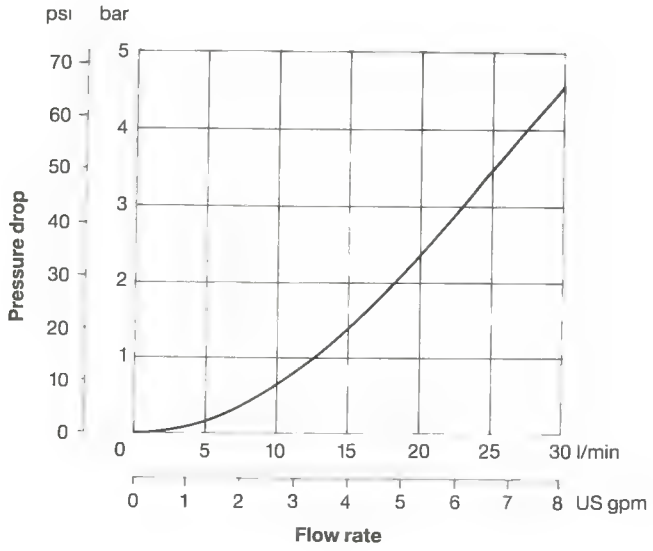
In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

3 Pilot pressure difference to shift, nominal
40 = 2,75 bar (40 psi)
80 = 5,5 bar (80 psi)
160 = 11,0 bar (160 psi)

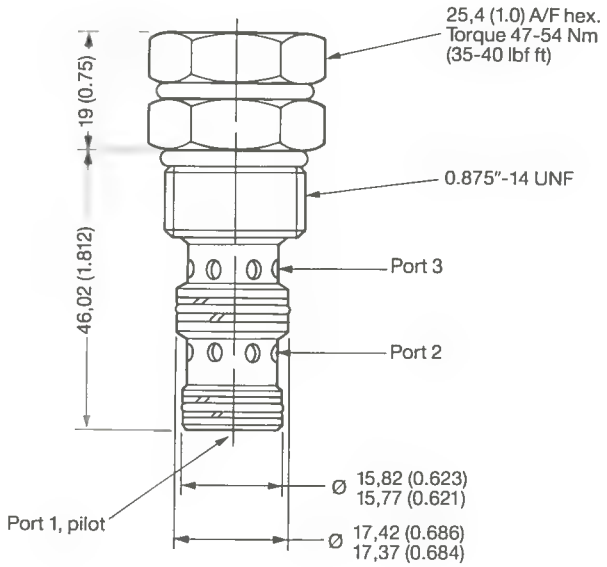
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, ports 1, 2 and 3	207 bar (3000 psi)
Rated flow	30 l/min (8 US gpm)
Pilot pressure difference to shift	See 3 in "Model code" above
Pilot displacement volume	0,49 cm³ (0.03 in³)
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 1 in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-3 For dimensions see page 247
Mass, cartridge only	0,10 kg (0.23 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 257 See page 253 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only



Installation dimensions in mm (inches)



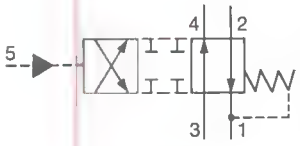
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PTS7-10-*	SK2-10-3
PTS7-10V-*	SK2-10V-3

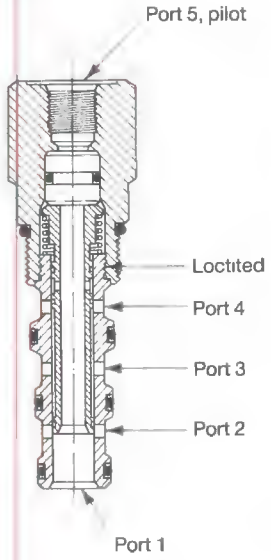
Pilot operated directional valves, four-way two-position series, with external pilot connection

PTS6-10

Functional symbol



Typical section



Model and ordering code

PTS6-10(V)--60**
[1] [2]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Form**
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

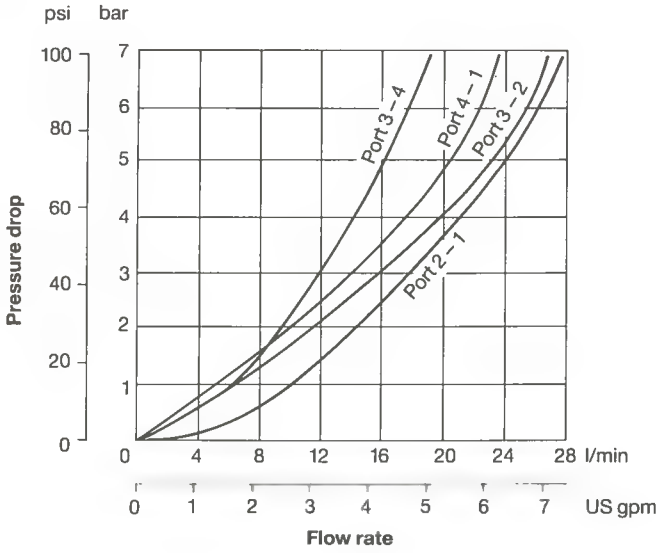
In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

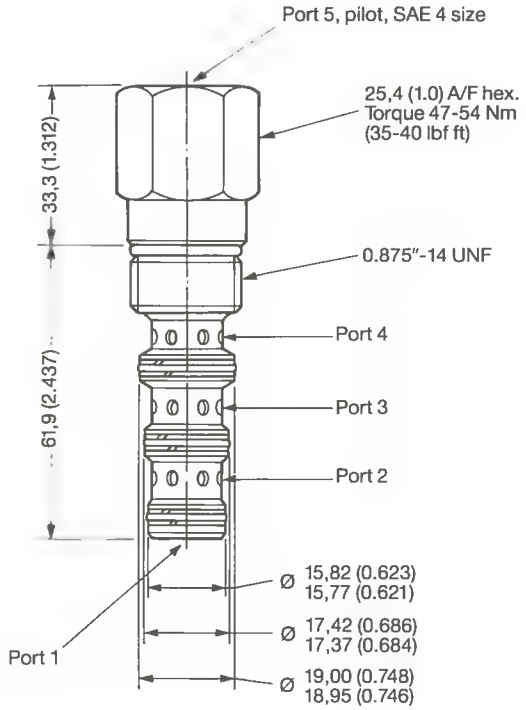
Max. pressure, all ports	207 bar (3000 psi)
Rated flow	23 l/min (6 US gpm)
Pilot pressure difference to shift	4,2 bar (60 psi) nominal
Pilot displacement volume	0,49 cm^3 (0.03 in^3)
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-4 For dimensions see page 247
Mass, cartridge only	0,15 kg (0.33 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 258 See page 254 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)



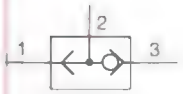
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PTS6-10-*	SK2-10-4
PTS6-10V-*	SK2-10V-4

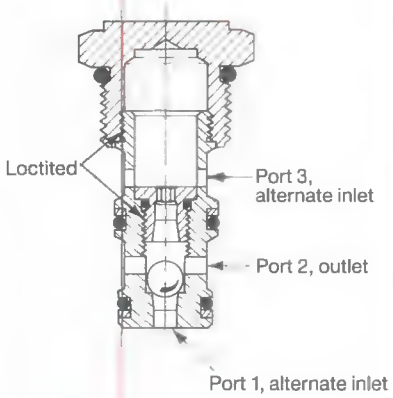
Shuttle valves, three-way series

DSV1-10(V)-B

Functional symbol



Typical section



Model and ordering code

DSV1-10(V)-B-**
[1] [2]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Form**
0 = Cartridge only

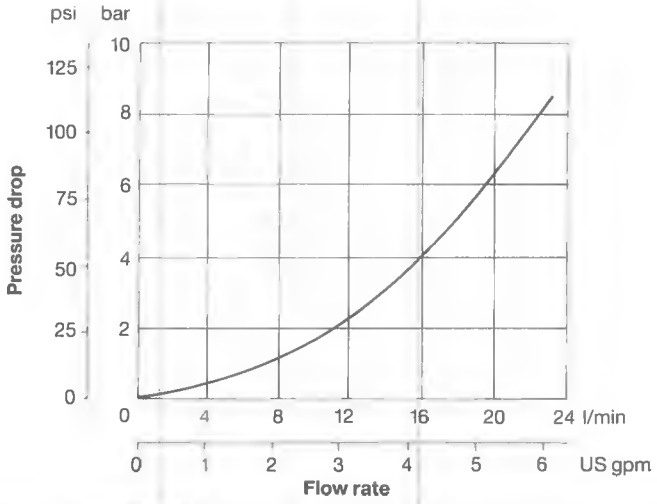
In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

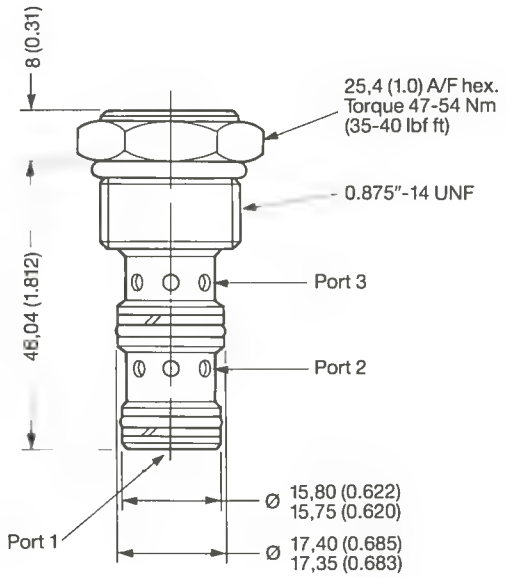
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)
Rated flow	23 l/min (6 US gpm)
Pressure drop characteristics	See graph below
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-3 For dimensions see page 247
Mass, cartridge only	0,08 kg (0.18 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 257 See page 253 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only



Installation dimensions in mm (inches)



Spare parts

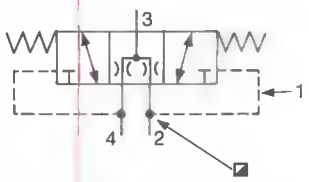
The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
DSV1-10-B	SK-10-3
DSV1-10V-B	SK-10V-3

Transmission shuttle valves, three-way three-position spring centered series

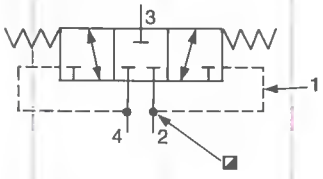
DSV4-10/16

Functional symbols

DSV4-**(V)-O-0

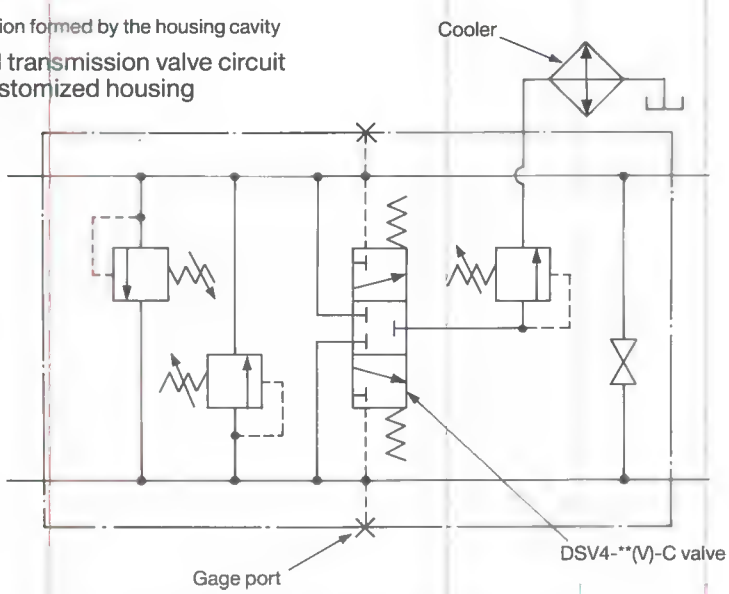


DSV4-**(V)-C-0



◪ Junction formed by the housing cavity

Typical transmission valve circuit in a customized housing



Model and ordering code

DSV4-(V)-*-0-*****

1 2 3 4

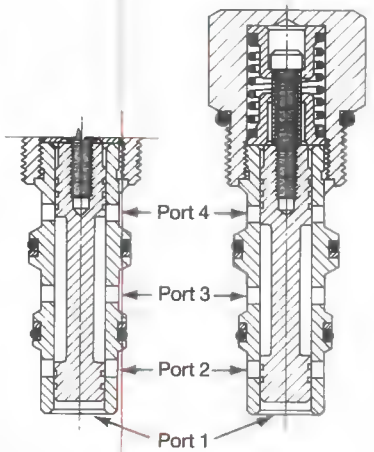
1 Nominal size/rated flow
10 = 26 l/min (7 US gpm)
16 = 114 l/min (30 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Spool configuration
C = Closed center
O = Open center

4 Pressure difference to shift, nominal
40 = 2,76 bar (40 psi)
80 = 5,5 bar (80 psi)
160 = 11,0 bar (160 psi)

Typical sections



DSV4-**(V)-O-0
Open-center model

DSV4-**(V)-C-0
Closed-center model

Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

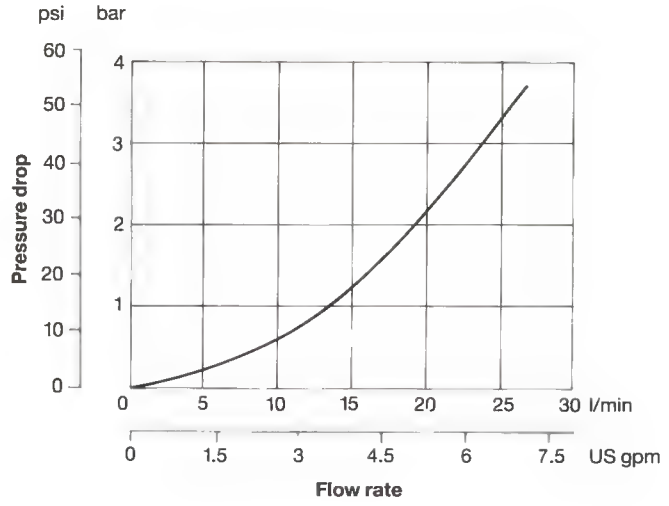
Usage	Typically, to divert fluid alternately from either side of a closed-loop transmission for the purpose of cooling and/or filtering. Usually built into a customized housing along with other transmission components, see "Functional symbols".
Max. pressure, all ports	345 bar (5000 psi)
Rated flow	See 1 in "Model code" above
Pressure difference to shift	See 4 in "Model code" above
Pressure drop characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See two pages on

Continued on next page

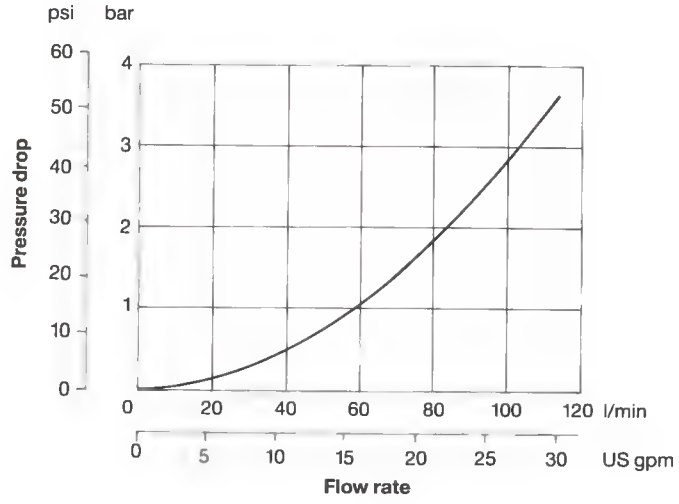
Cavity size for:	
DSV4-10	C-10-4
DSV4-16	C-16-4
	For dimensions see page 247
Mass, cartridge only:	
DSV4-10	0,14 kg (0.30 lb)
DSV4-16	0,5 kg (1.1 lb)
Housing options:	
DSV4 valves are normally used in customized transmission valve housings; see the typical circuit in the "Functional Symbols" section on previous page.	
For customized housings	Consult your local sales engineer
It is technically feasible to use a DSV4 valve in a single-cavity housing at up to 207 bar (3000 psi):	
Standard light-duty type	See page 258
Standard fatigue-rated type	See page 254
These housings must be ordered separately from the valves.	
Spare parts	See next page

Pressure drop characteristics
Cartridges only
Spool fully shifted

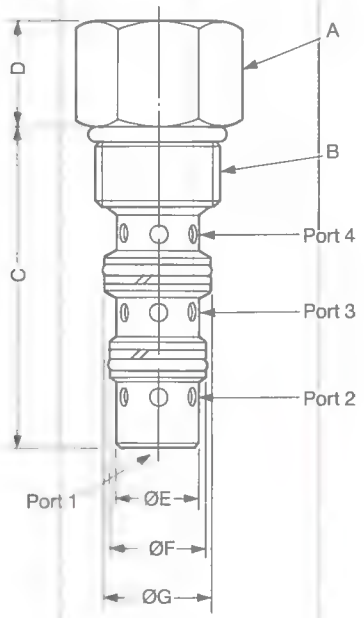
DSV4-10



DSV4-16



Installation dimensions in mm (inches)



Model	A	B	C	D	ØE	ØF	ØG
DSV4-10	25,4 (1.0) A/F hex. Torque 47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	58,34 (2.297)	19 (0.75)	14,3 (0.562)	17,42 (0.686) 17,37 (0.684)	19,00 (0.748) 18,95 (0.746)
DSV4-16	38,1 (1.5) A/F hex. Torque 109-122 Nm (80-90 lbf ft)	1.3125″-12 UN	95,3 (3.75)	29 (1.14)	22.22 (0.875)	26,95 (1.061) 26,90 (1.059)	28,55 (1.124) 28,50 (1.122)

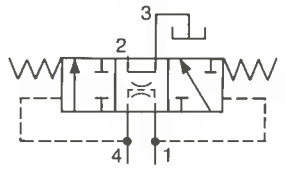
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
DSV4-10-*	SK-10B-3A
DSV4-10V-*	SK-10VB-3A
DSV4-16-*	SK-16B-3
DSV4-16V-*	SK-16VB-3

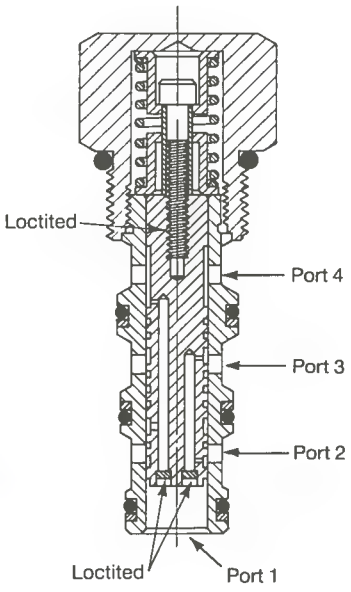
Brake release valves, four-way three-position spring centred series

DSV5-10

Functional symbol



Typical section



Model and ordering code

DSV5-10(V)-**
[1] [2]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Form**
0 = Cartridge only

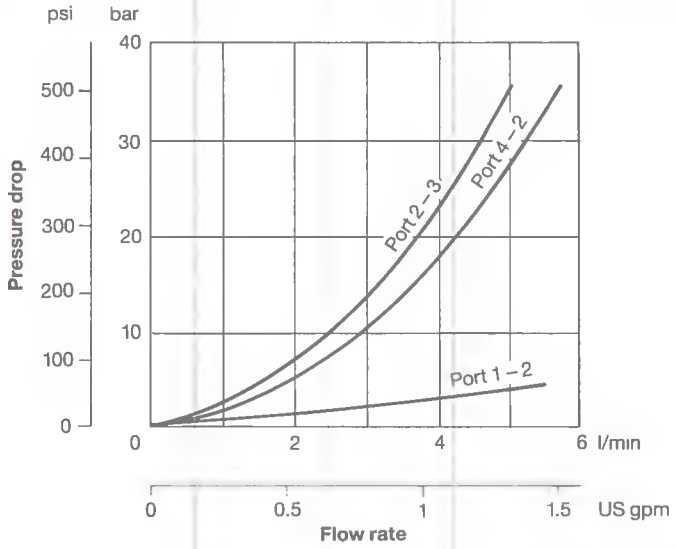
In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

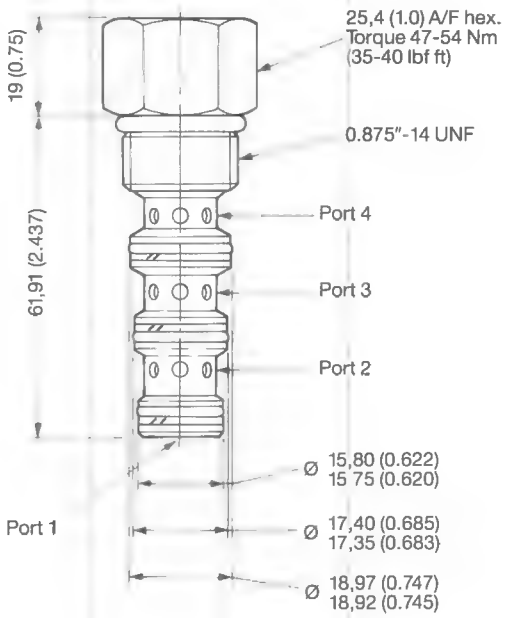
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Usage	To allow a spring-applied brake to be applied to a hydraulic motor drive when a four-way three-position tandem or blocked center valve is centered
Max. pressure, all ports	207 bar (3000 psi)
Rated flow	5,5 l/min (1.5 US gpm)
Pilot pressure difference to shift	5,5 bar (80 psi) nominal
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-4 For dimensions see page 247
Mass, cartridge only	0,14 kg (0.32 lb)
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 258 See page 254 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only



Installation dimensions in mm (inches)



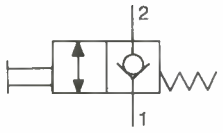
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
DSV5-10-*	SK-10-4
DSV5-10V-*	SK-10V-4

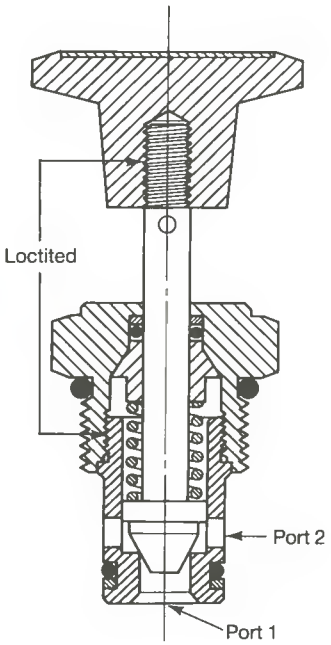
Manually operated directional valves, two-way two-position pull-to-open series

MPV1-10(V)-K

Functional symbol



Typical section



Model and ordering code

MPV1-10(V)-K-***
[1] [2]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Form**
0 = Cartridge only

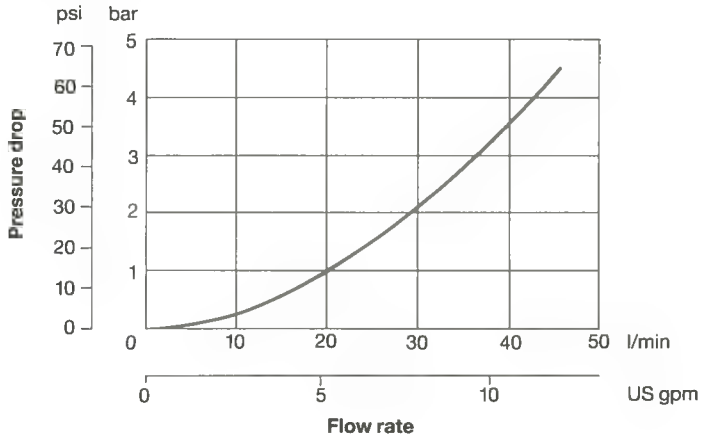
In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

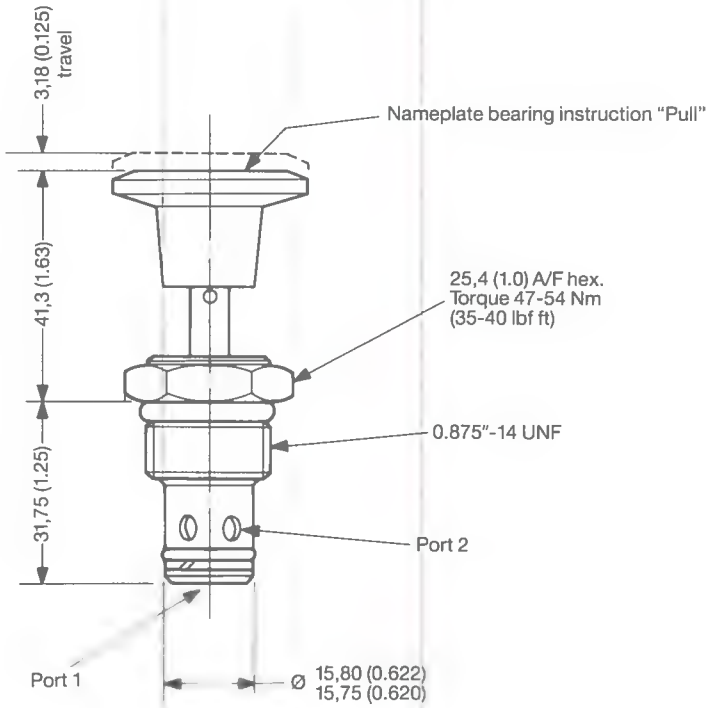
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	45 l/min (12 US gpm)
Pressure drop characteristics	See graph below
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-2 For dimensions see page 247
Mass, cartridge only	0,11 kg (0.24 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only



Installation dimensions In mm (inches)



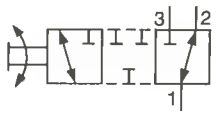
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
MPV1-10-K	SK-10-2
MPV1-10V-K	SK-10V-2

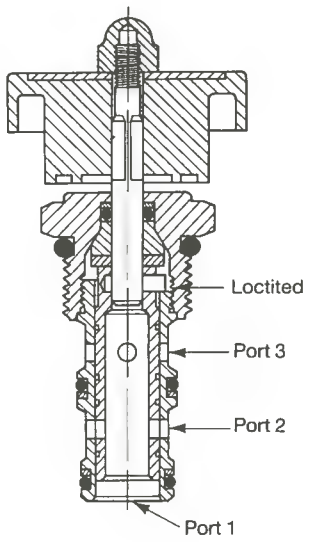
Manual semi-rotary directional valves, three-way two-position series

MRV3-10(V)/16(V)-K

Functional symbol



Typical section



MRV3-10(V)-K
Similar construction for MRV3-16(V)-K

Model and ordering code

MRV3- ** (V)-K-***
[1] [2] [3]

[1] Nominal size/rated flow
10 = 23 l/min (6 US gpm)
16 = 64 l/min (17 US gpm)

[2] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

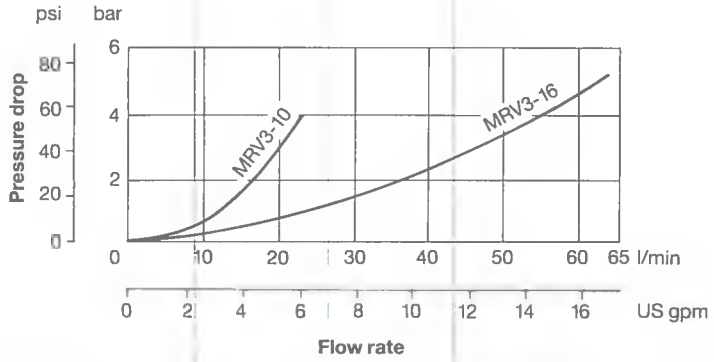
[3] Form

Code	Port size	For cartridge
0 = Cartridge only		
In light-duty housing; 207 bar (3000 psi) max.		
6T	= SAE 6	MRV3-10
12T	= SAE 12	MRV3-16
In NFPA fatigue-rated housing; 207 bar (3000 psi) max.		
6H	= SAE 6	MRV3-10
8H	= SAE 8	MRV3-10
2G	= G¼" (BSPF)	MRV3-10
3G	= G⅜" (BSPF)	MRV3-10
10H	= SAE 10	MRV3-16
12H	= SAE 12	MRV3-16
4G	= G½" (BSPF)	MRV3-16
6G	= G¾" (BSPF)	MRV3-16

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

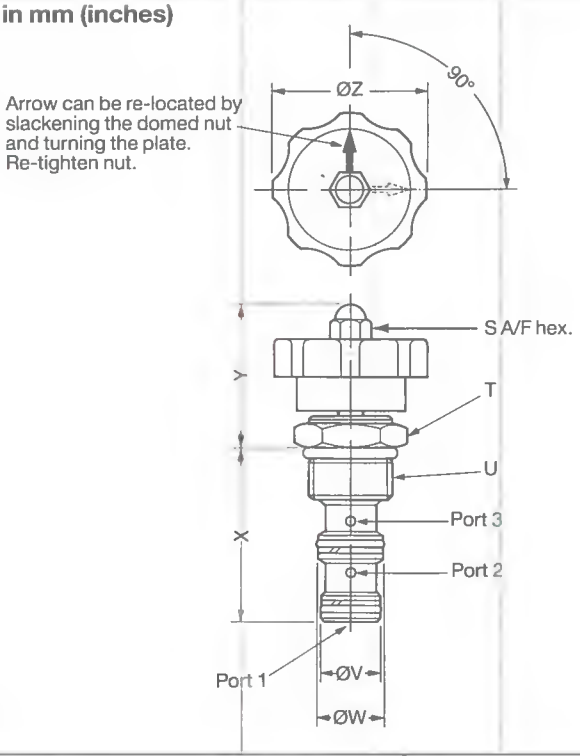
Max. pressure, all ports	207 bar (3000 psi)
Rated flow	See [1] in "Model code" above
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size for:	
MRV3-10	C-10-3
MRV3-16	C-16-3
	For dimensions see page 247
Mass, cartridge only:	
MRV3-10	0,12 kg (0.27 lb) approx.
MRV3-16	0,32 kg (0.71 lb) approx.
Housing options:	
Standard light-duty type	See page 257
Standard fatigue-rated type	See page 253
Customized types	Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only
Port 3 to 1 or 1 to 2



Installation dimensions in mm (inches)

3rd angle projection



Model	S A/F	T	U
MRV3-10	9,5 (0.375)	25,4 (1.0) A/F hex. Torque 47-54 Nm (35-40 lbf ft)	0.875″-14 UNF
MRV3-16	11,1 (0.438)	38,1 (1.5) A/F hex. Torque 109-122 Nm (80-90 lbf ft)	1.3125″-12 UN

Model	ØV	ØW	X	Y	ØZ
MRV3-10	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)	46,04 (1.812)	37 (1.45)	42 (1.65)
MRV3-16	26,95 (1.061) 26,90 (1.059)	28,55 (1.124) 28,50 (1.122)	73,03 (2.875)	53 (2.08)	61 (2.4)

Spare parts

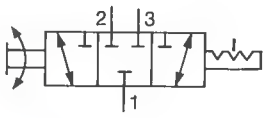
The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
MRV3-10-K	SK-10-3
MRV3-10V-K	SK-10V-3
MRV3-16-K	SK2-16-3
MRV3-16V-K	SK2-16V-3

Manual semi-rotary directional valves, three-way, two- and three-position detented series

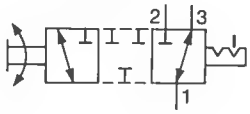
MRV3-10(V)-D(2)/E(2) MRV3-16(V)-D

Functional symbols

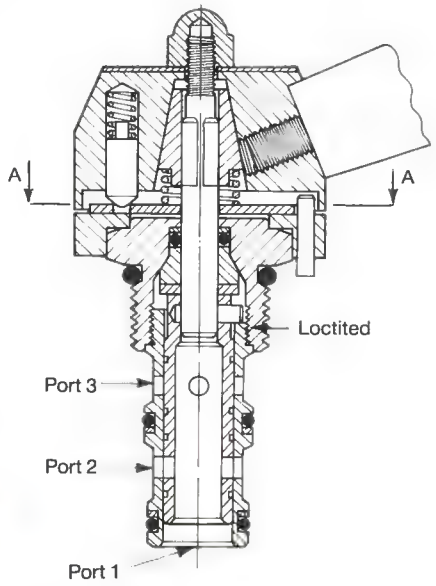
MRV3-10(V)-D/E
MRV3-16(V)-D
Three-position models



MRV3-10(V)-D2/E2
Two-position models

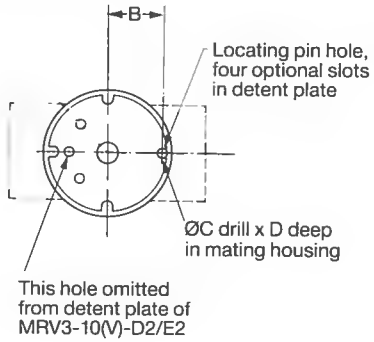


Typical section



MRV3-10(V)-D(2)
Similar construction for MRV3-16(V)-D and MRV3-10(V)-E(2) models except latter has a ball lever handle

Locating pin installation
View on A-A



Model	B	ØC	D
MRV3-10(V)D(2)/E(2)-***	17,07 ±0.05 (0.672 ±0.002)	3,45 3,50 (#29 or 0.136 $^{0}_{+0.002}$)	4,76 (0.187)
MRV3-16(V)D-***	24,89 ±0.05 (0.980 +0.002)		

Model and ordering code

MRV3-(V)-**-****

1 2 3 4

1 Nominal size/rated flow
10 = 23 l/min (6 US gpm)
16 = 64 l/min (17 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Operation
D = Lever (3-position detent)
D2 = Lever (2-position detent) (MRV3-10 only)
E = Ball lever (3-position detent) (MRV3-10 only)
E2 = Ball lever (2-position detent) (MRV3-10 only)

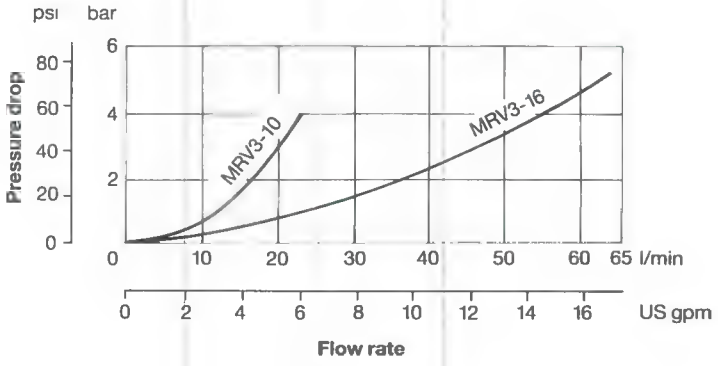
4 Form

Code	Port size	For cartridge
0 = Cartridge only		
In light-duty housing; 207 bar (3000 psi) max.		
6T	SAE 6	MRV3-10
12T	SAE 12	MRV3-16
In NFPA fatigue-rated housing; 207 bar (3000 psi) max.		
6H	SAE 6	MRV3-10
8H	SAE 8	MRV3-10
2G	G¼" (BSPF)	MRV3-10
3G	G⅜" (BSPF)	MRV3-10
10H	SAE 10	MRV3-16
12H	SAE 12	MRV3-16
4G	G½" (BSPF)	MRV3-16
6G	G¾" (BSPF)	MRV3-16

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)
Rated flow	See [1] in "Model code" on previous page
Pressure drop characteristics	See graph below
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size for:	
MRV3-10	C-10-3
MRV3-16	C-16-3
	For dimensions see page 247
Mass, cartridge only:	
MRV3-10	0,22 kg (0.48 lb) approx.
MRV3-16	0,53 kg (1.16 lb) approx.
Housing options:	
Standard light-duty type	See page 257
Standard fatigue-rated type	See page 253
Customized types	Consult your local sales engineer
Spare parts	See next page

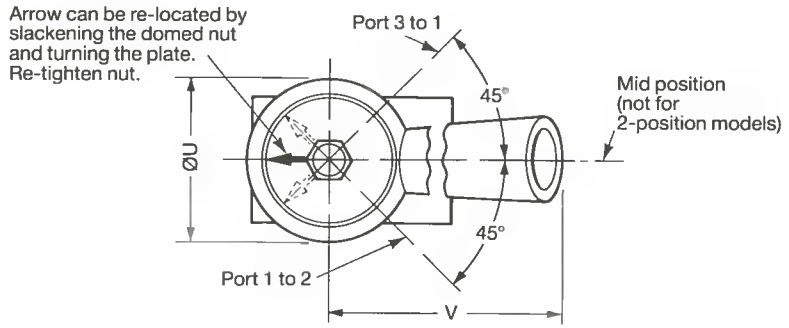
Pressure drop characteristics
Cartridges only
Port 3 to 1 or 1 to 2



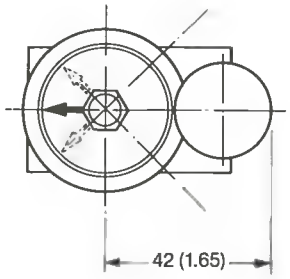
Installation dimensions in mm (inches)

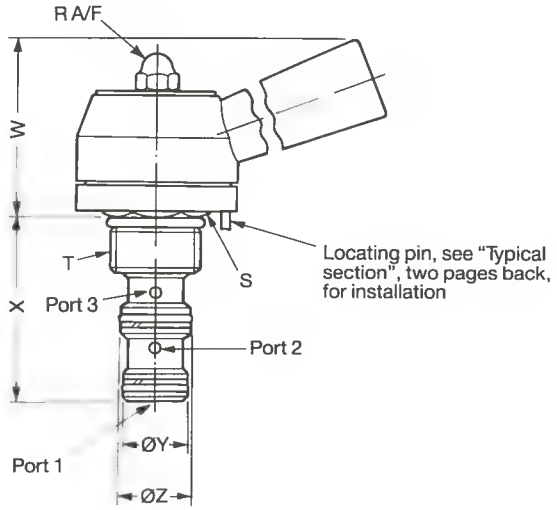
3rd angle projection

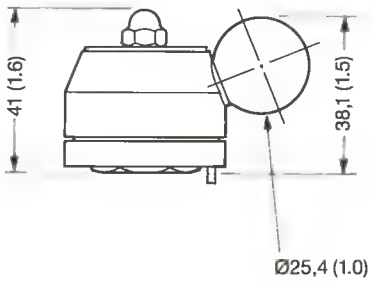
MRV3-**(V)-D(2)



MRV3-10(V)-E(2)







Model	R A/F	S	T	ØU	V
MRV3-10	9,5 (0.375)	25,4 (1.0) A/F hex. Torque 47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	41 (1.61)	83 (3.27)
MRV3-16	11,1 (0.438)	38,1 (1.5) A/F hex. Torque 109-122 Nm (80-90 lbf ft)	1.3125″-12 UN	58 (2.28)	105 (4.13)

Model	W	X	ØY	ØZ
MRV3-10	58 (2.28)	46,04 (1.812)	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)
MRV3-16	76 (3.0)	73,03 (2.875)	26,95 (1.061) 26,90 (1.059)	28,55 (1.124) 28,50 (1.122)

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

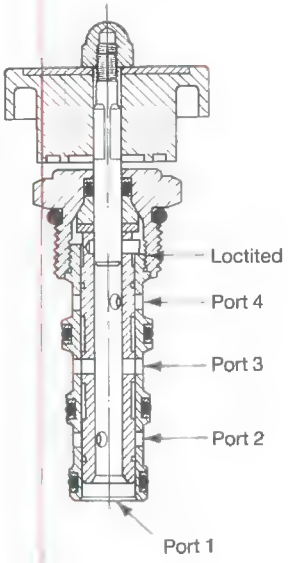
	Kit no.
MRV3-10-*(2)	SK-10-3
MRV3-10V-*(2)	SK-10V-3
MRV3-16-D	SK2-16-3
MRV3-16V-D	SK2-16V-3

Manual semi-rotary directional valves, four-way two-position series

MRV4-10(V)/16(V)-K

Functional symbol

Typical section



MRV4-10(V)-K
Similar construction for MRV4-16(V)-K

Model and ordering code

MRV4-(V)-K-*****
[1] [2] [3]

[1] Nominal size/rated flow
10 = 11 l/min (3 US gpm)
16 = 45 l/min (12 US gpm)

[2] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[3] Form

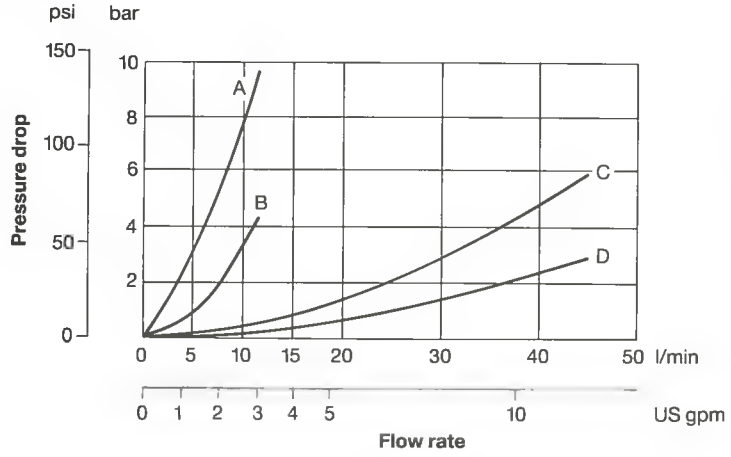
Code	Port size	For cartridge
0 = Cartridge only		
In light-duty housing; 207 bar (3000 psi) max.		
6T	= SAE 6	MRV4-10
12T	= SAE 12	MRV4-16
In NFPA fatigue-rated housing; 207 bar (3000 psi) max.		
6H	= SAE 6	MRV4-10
8H	= SAE 8	MRV4-10
2G	= G¼" (BSPF)	MRV4-10
3G	= G⅜" (BSPF)	MRV4-10
10H	= SAE 10	MRV4-16
12H	= SAE 12	MRV4-16
4G	= G½" (BSPF)	MRV4-16
6G	= G¾" (BSPF)	MRV4-16

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)
Rated flow	See [1] in "Model code" above
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size for: MRV4-10 MRV4-16	 C-10-4 C-16-4 For dimensions see page 247
Mass, cartridge only: MRV4-10 MRV4-16	 0,17 kg (0.38 lb) approx. 0,44 kg (0.98 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 258 See page 254 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics

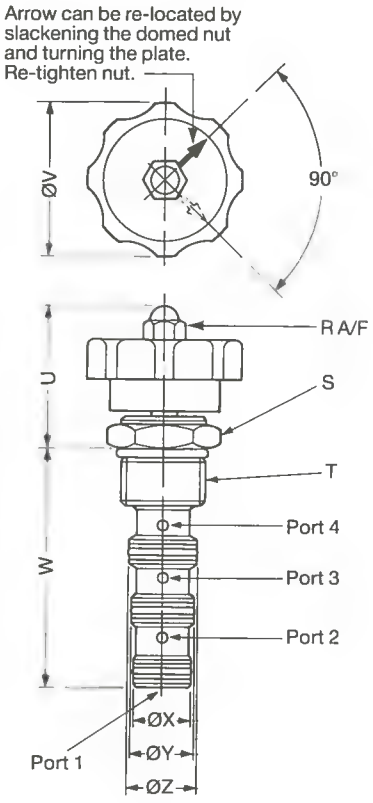
Cartridges only



Legend
A = MRV4-10, Port 3 to 4 or 3 to 2
B = MRV4-10, Port 4 to 1 or 2 to 1
C = MRV4-16, Port 3 to 4 or 3 to 2
D = MRV4-16, Port 4 to 1 or 2 to 1

Installation dimensions in mm (inches)

3rd angle projection



Model	R A/F	S	T	U	ØV
MRV4-10	9,5 (0.375)	25,4 (1.0) A/F hex. Torque 47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	37 (1.46)	42 (1.65)
MRV4-16	11,1 (0.438)	38,1 (1.5) A/F hex. Torque 109-122 Nm (80-90 lbf ft)	1.3125″-12 UN	53 (2.09)	61 (2.4)

Model	W	ØX	ØY	ØZ
MRV4-10	61,91 (2.437)	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)	18,97 (0.747) 18,92 (0.745)
MRV4-16	101,6 (4.0)	25,37 (0.999) 25,32 (0.997)	26,95 (1.061) 26,90 (1.059)	28,55 (1.124) 28,50 (1.122)

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

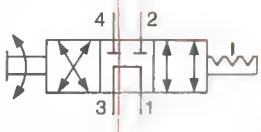
	Kit no.
MRV4-10-K	SK2-10-4
MRV4-10V-K	SK2-10V-4
MRV4-16-K	SK2-16-4
MRV4-16V-K	SK2-16V-4

Manual semi-rotary directional valves, four-way three-position detented series

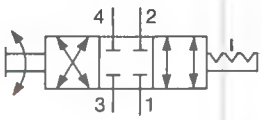
MRV4/5/6-10(V)-D/E
MRV4/5-16(V)-D

Functional symbols

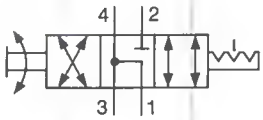
MRV4-10
MRV4-16



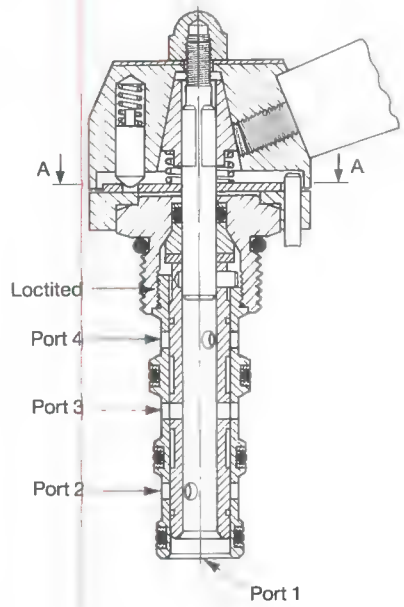
MRV5-10
MRV5-16



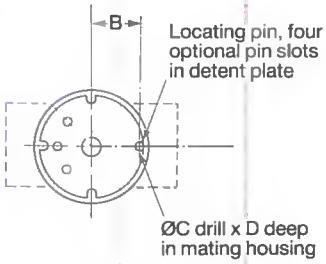
MRV6-10



Typical section



Locating pin installation
View on A-A



MRV4-10(V)-D/E
Similar construction for MRV5/6-10(V)-D/E and MRV4/5-16(V)-D

Model	B	ØC	D
MRV*-10	17,07 ±0.05 (0.672 ±0.002)	3,45 3,50 (#29 or 0.136 $^{0}_{+0.002}$)	4,76 (0.187)
MRV*-16	24,89 ±0.05 (0.980 ±0.002)		

Model and ordering code

MRV*-(V) -*- *****
1 2 3 4 5

1 Type
4, 5 or 6. See "Functional symbols"

2 Nominal size/rated flow
10 = 11 l/min (3 US gpm)
16 = 45 l/min (12 US gpm)

3 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

4 Operation
D = Lever (3-position detent)
E = Ball lever (3-position detent), MRV*-10 models only

5 Form

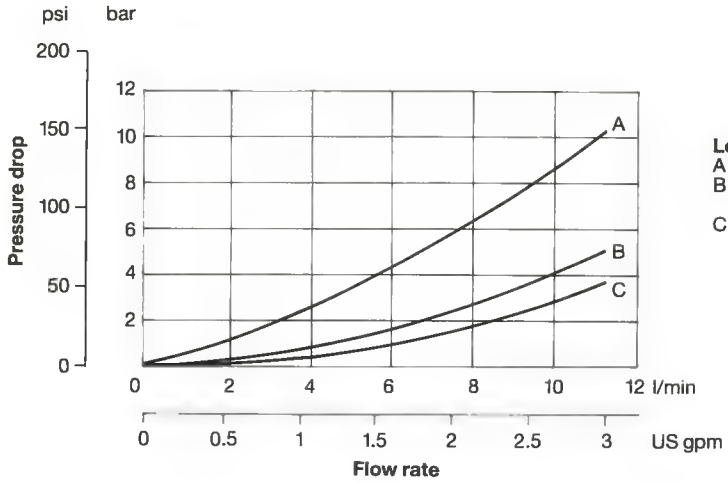
Code	Port size	For cartridge
0 = Cartridge only		
In light-duty housing; 207 bar (3000 psi) max.		
6T	= SAE 6	MRV*-10
12T	= SAE 12	MRV*-16
In NFPA fatigue-rated housing; 207 bar (3000 psi) max.		
6H	= SAE 6	MRV*-10
8H	= SAE 8	MRV*-10
2G	= G¼" (BSPF)	MRV*-10
3G	= G⅜" (BSPF)	MRV*-10
10H	= SAE 10	MRV*-16
12H	= SAE 12	MRV*-16
4G	= G½" (BSPF)	MRV*-16
6G	= G¾" (BSPF)	MRV*-16

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)
Rated flow	See [2] in "Model code" on previous page
Pressure drop characteristics	See graphs below
Hydraulic fluids, temperature ranges and filtration recommendations	See [3] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size for: MRV*-10 MRV*-16	 C-10-4 C-16-4 For dimensions see page 247
Mass, cartridge only: MRV*-10 MRV*-16	 0,27 kg (0.59 lb) approx. 0,65 kg (1.43 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 258 See page 254 Consult your local sales engineer
Spare parts	See next page

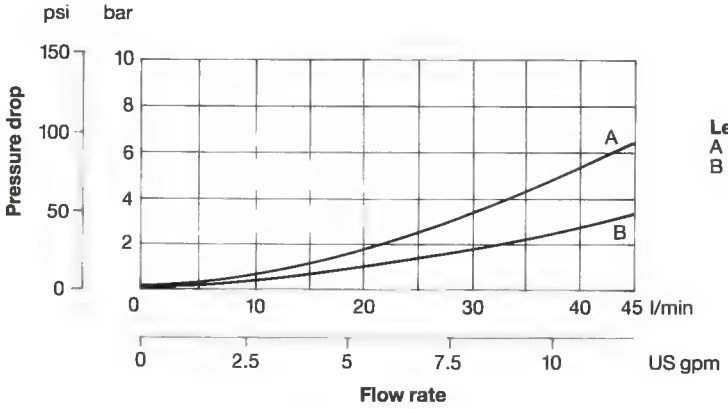
Pressure drop characteristics
Cartridges only

MRV*-10



Legend
A = MRV4/5/6-10. Port 3 to 4 or 3 to 2
B = MRV4-10. Port 4 to 1, 2 to 1 or 3 to 1
MRV5/6-10. Port 4 to 1
C = MRV5/6-10. Port 2 to 1

MRV*-16

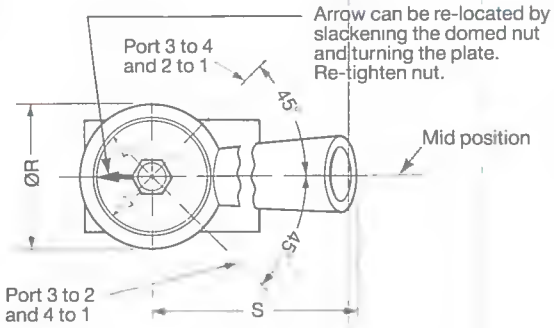


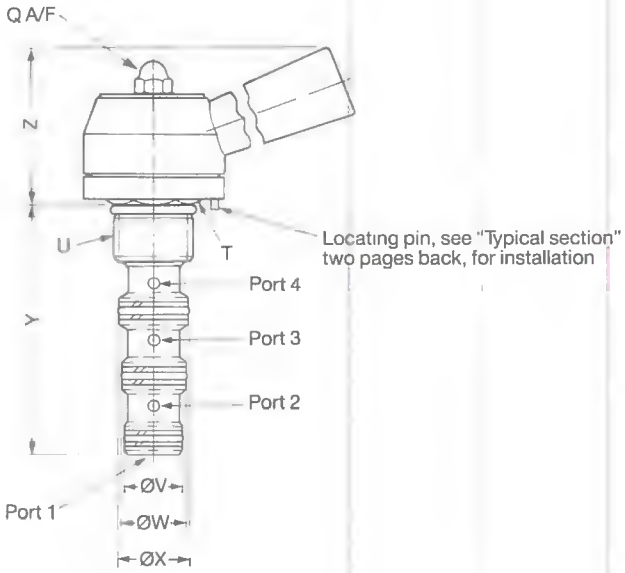
Legend
A = MRV4/5-16. Port 3 to 4 or 3 to 2
B = MRV4-16. Port 3 to 1, 4 to 1 or 2 to 1
MRV5-16. Port 4 to 1 or 2 to 1

Installation dimensions in mm (inches)

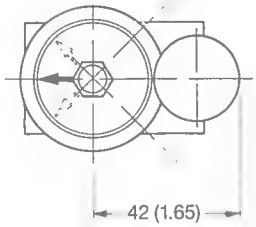
3rd angle projection

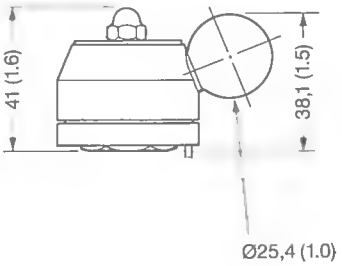
MRV*-**(V)-D





MRV*-10(V)-E





Model	Q A/F	ØR	S	T	U
MRV*-10	9,5 (0.375)	41(1.61)	83 (3.27)	25,4 (1.0) A/F hex. Torque 47-54 Nm (35-40 lbf ft)	0.875"-14 UNF
MRV*-16	11,1 (0.438)	58 (2.28)	105 (4.13)	38,1 (1.5) A/F hex. Torque 109-122 Nm (80-90 lbf ft)	1.3125"-12 UN

Model	ØV	ØW	ØX	Y	Z
MRV*-10	15,82 (0.623) 15,77 (0.621)	17,42 (0.686) 17,37 (0.684)	19,00 (0.748) 18,95 (0.746)	61,91 (2.437)	58 (2.28)
MRV*-16	25,37 (0.999) 25,32 (0.997)	26,95 (1.061) 26,90 (1.059)	28,55 (1.124) 28,50 (1.122)	101,6 (4.0)	77 (3.03)

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

	Kit no.
MRV4/5/6-10-D/E	SK2-10-4
MRV4/5/6-10V-D/E	SK2-10V-4
MRV4/5-16-D	SK2-16-4
MRV4/5-16V-D	SK2-16V-4

Pressure controls

Vickers Modular offers a full range of direct and pilot operated relief, reducing, sequence and unloading valves. The range of variants available is shown on pages 12 to 14, while specific data is given on the following pages. In general, the direct operated products are fastest in response while pilot operated types have a flatter pressure/flow characteristic.

Relief valves
When selecting a relief valve for a specific application, consideration should be given to the following:

- **Direct operated poppet types (RV1 and RV7)**
  Suitable for continuous duty with reliable fast response, the RV7 being a low pressure, low cost option. These valves are also suitable for piloting the DPS2 logic elements, see page 242.

- **Pilot operated poppet type with reverse free-flow check (RV2)**
  Ideal for use as a service line relief where anticavitation make-up is required. It may also be applied as an internally piloted counterbalance valve in a service line.

- **Direct operated poppet type, annular area models (RV3 and RV8)**
  Sometimes termed a "differential area relief valve". A fast-acting valve, highly tolerant of contaminant and providing an alternative flow path, frequently beneficial in manifold layout. Utilized in CRV3 cross-line relief packages.

- **Pilot operated spool type (RV5)**
  Well suited for repetitive, continuous duty with a low pressure-override characteristic. Used in CRV5 cross-line relief packages.

- **Direct operated ball type (RV6)**
  A fast-acting valve for intermittent duty. This low flow, low cost valve may be used as a pilot section for a larger main-stage valve.

Reducing valves
Three types are available:

- Direct operated with relieving feature (PRV1)
- Pilot operated with relieving feature (PRV2)
- Direct operated (PRV4)

The relieving feature is useful where overpressure may occur, e.g. due to external mechanical forces acting on the actuator.

Sequence valves
A complete range of sequence functions is available, including:

- Normally-closed and normally-open models
- Internal and external pilot options
- Internal and external drain options
- Two- and three- position models

Externally drained models may be used as relief valves in circuits with alternating pressure and tank line functions.

Accumulator unloading valves
Valves that allow accumulators to be charged to a pre-selected maximum pressure at which the pump is unloaded. The pump does not cut-in until the accumulator pressure has decayed to a pre-selected percentage of maximum pressure. The low-flow PUV3 model can be used as a stand-alone model for low flow applications, or as a pilot stage in two-stage arrangements for higher flows.

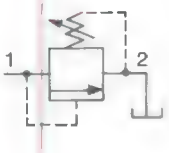
Accumulator discharge valve
This valve is designed to ensure that an accumulator will discharge when pilot pressure is lost, e.g. on pump shut-down.

Pressure relief valves

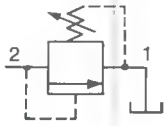
RV1/2/3/5/6/7/8-10

Functional symbols

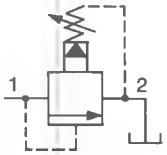
RV1, RV6 and RV7



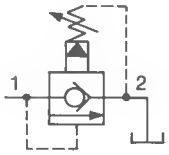
RV3 and RV8



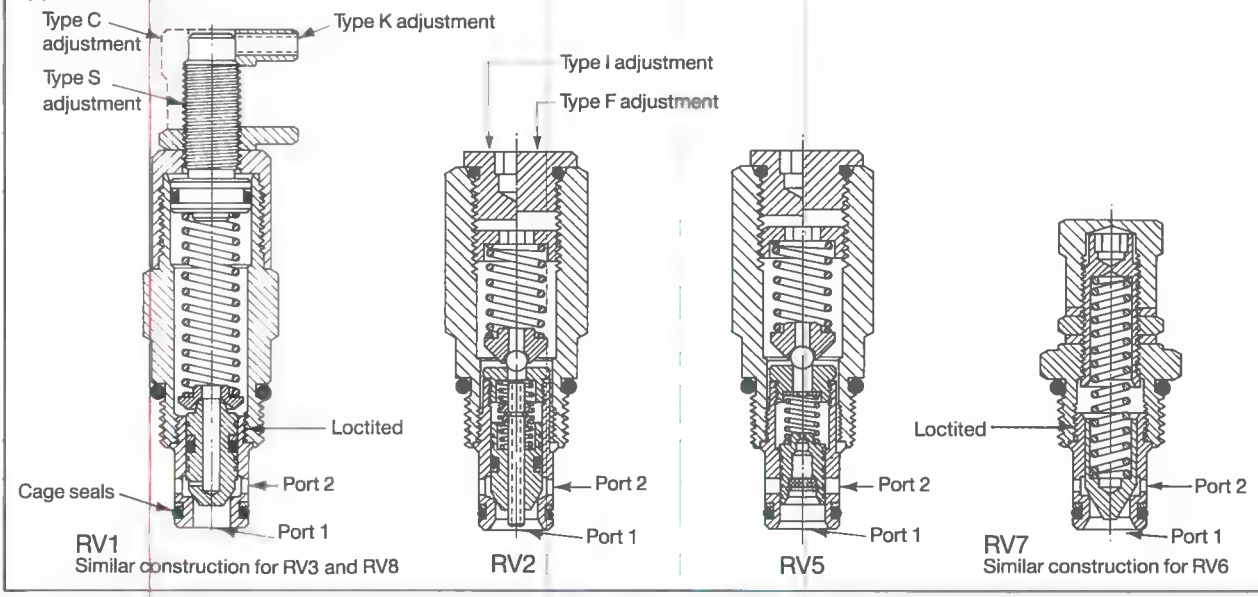
RV5



RV2



Typical sections



Model and ordering code

RV * (A)-10(V)-* --**/****

1 2 3 4 5 6 7

1 Type and max. power capacity

Code	Description Also see "Functional symbols" section	Max. pressure bar (psi), all ports	Rated flow l/min (US gpm)
1	Direct-acting poppet type	207 (3000)■	38 (10)
2	Two-stage poppet type	207 (3000)■	114 (30)
3	Direct-acting poppet type	207 (3000)■	76 (20)
5	Two-stage spool type	207 (3000)■	114 (30)
6	Direct-acting ball type	207 (3000)■	15 (4)
7	Direct-acting poppet type	69 (1000)	38 (10)
8	Direct-acting poppet type	207 (3000)■	76 (20)

■ For higher pressure models, consult your local sales engineer

2 Cage seals

Blank = For standard valves; seals as shown above.

A = Back-up ring on both sides of O-ring. Option for RV3, 5 and 8 models if high pressure is to alternate between both ports e.g. in cross-line relief packages, see CRV3-10 models.

3 Fluid compatibility

Blank = Antiwear hydraulic oil

V = As above or with phosphate-ester (not alkyl type)

Continued on next page

4 Cracking pressure setting adjustment
C = Cap and nut
F = Factory-set, see 6 ▲
I = Internal ▲
K = Knob ▲
S = Screw ▲
▲ Options not available with RV6 and RV7 valves

5 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

6 Cracking pressure ▲ adjustment range, bar (psi)
RV1 models ■
3 = 3,45-20,6 (50-300)
9 = 6,9-62,0 (100-900)
18 = 17,3-124 (250-1800)

RV2 models ■
3 = 3,45-20,6 (50-300)
20 = 6,9-137 (100-2000)

RV3 models ■
3 = 3,45-20,6 (50-300)
6 = 6,9-41,3 (100-600)
9 = 13,8-62,0 (200-900)
18 = 20,7-124 (300-1800)
27 = 0-189 (0-2750)

RV5 models ■
3 = 3,45-20,6 (50-300)
20 = 6,9-137 (100-2000)

RV6 models ■
25 = 3,45-172 (50-2500)

RV7 models
2 = 1,73-17,2 (25-250)
5 = 3,45-34,4 (50-500)
10 = 17,3-68,9 (250-1000)

RV8 models ■
4 = 3,45-31,0 (50-450)
12 = 6,9-86,2 (100-1250)
25 = 17,3-172 (250-2500)
▲ Differential pressure, inlet-outlet
■ For higher pressure models, consult your local sales engineer

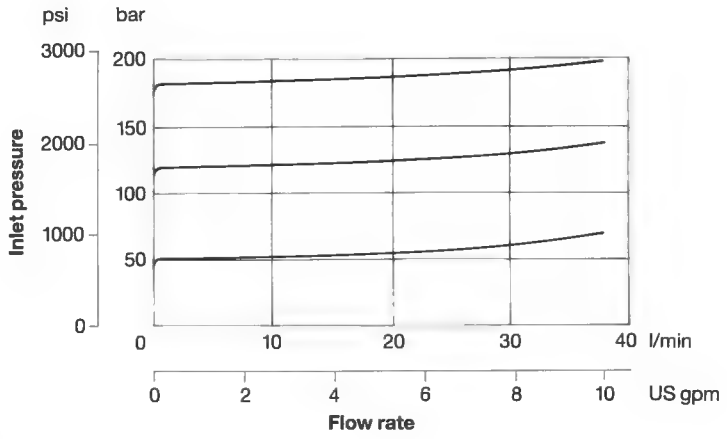
7 Factory-set cracking pressure
Within ranges in 6 above
Blank = Normal factory setting, at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

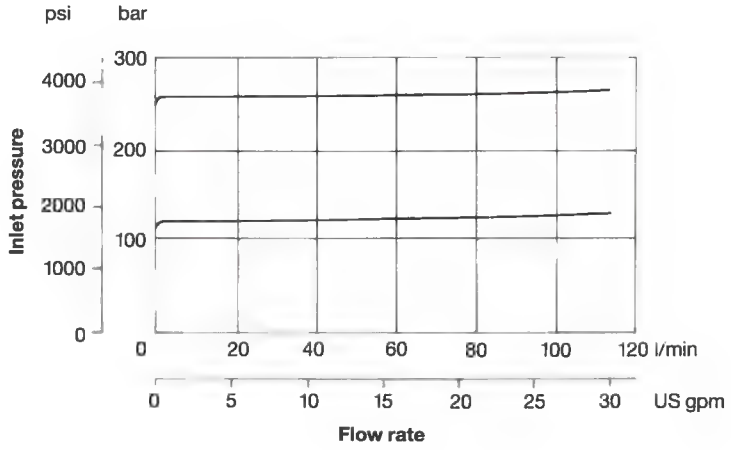
Cracking pressure adjustment range	See 6 and 7 in "Model code"
Max. power capacity	See 1 in "Model code"
Pressure override characteristics	See graphs below and on next page
Re-seat pressure: RV2 and RV5 valves All other models	 Approx. 5,2 bar (75 psi) below cracking pressure Approx. 90% of set cracking pressure
Hydraulic fluids, temperature ranges and filtration recommendations	See 3 in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See two pages on
Cavity size	C-10-2 For dimensions see page 247
Mass, cartridge only	0,22 kg (0.48 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See two pages on

Pressure override characteristics
Cartridges only
With tank pressure at zero

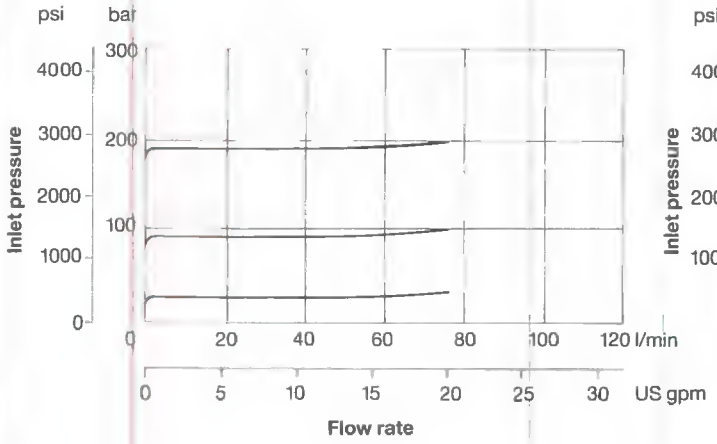
RV1



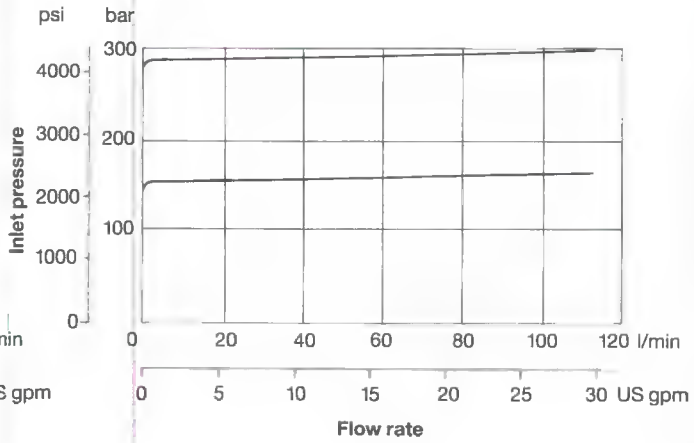
RV2



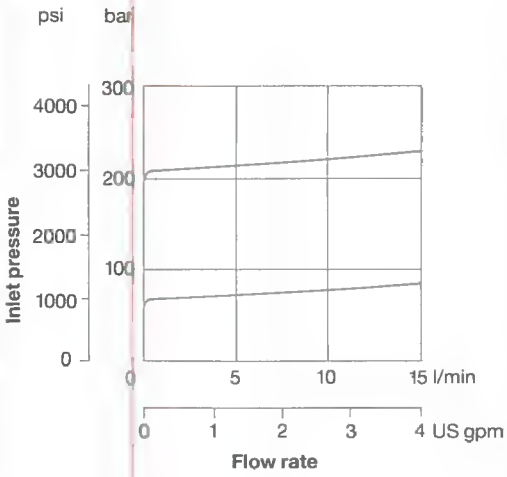
RV3



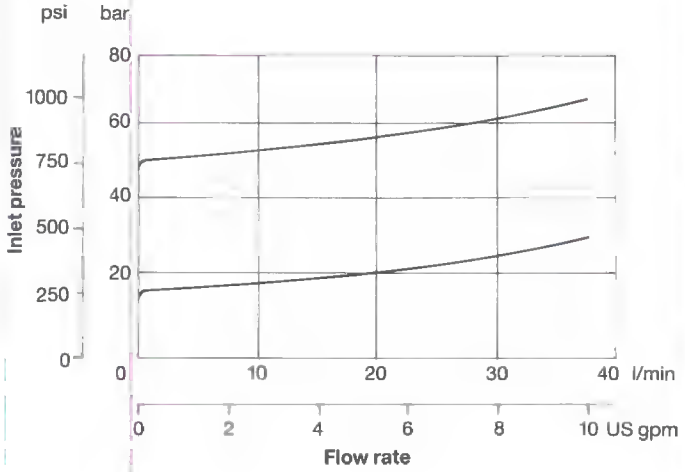
RV5



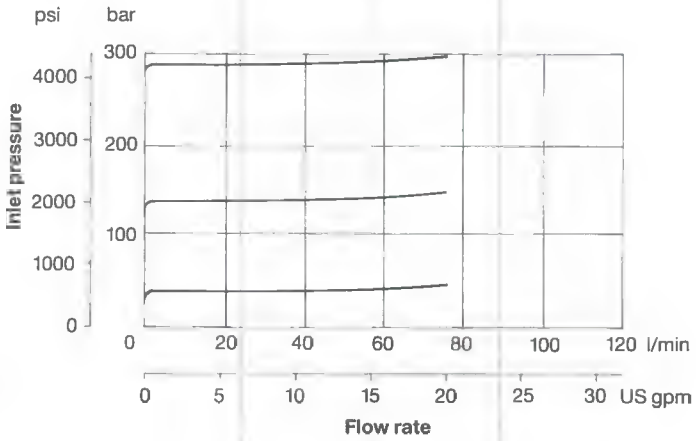
RV6



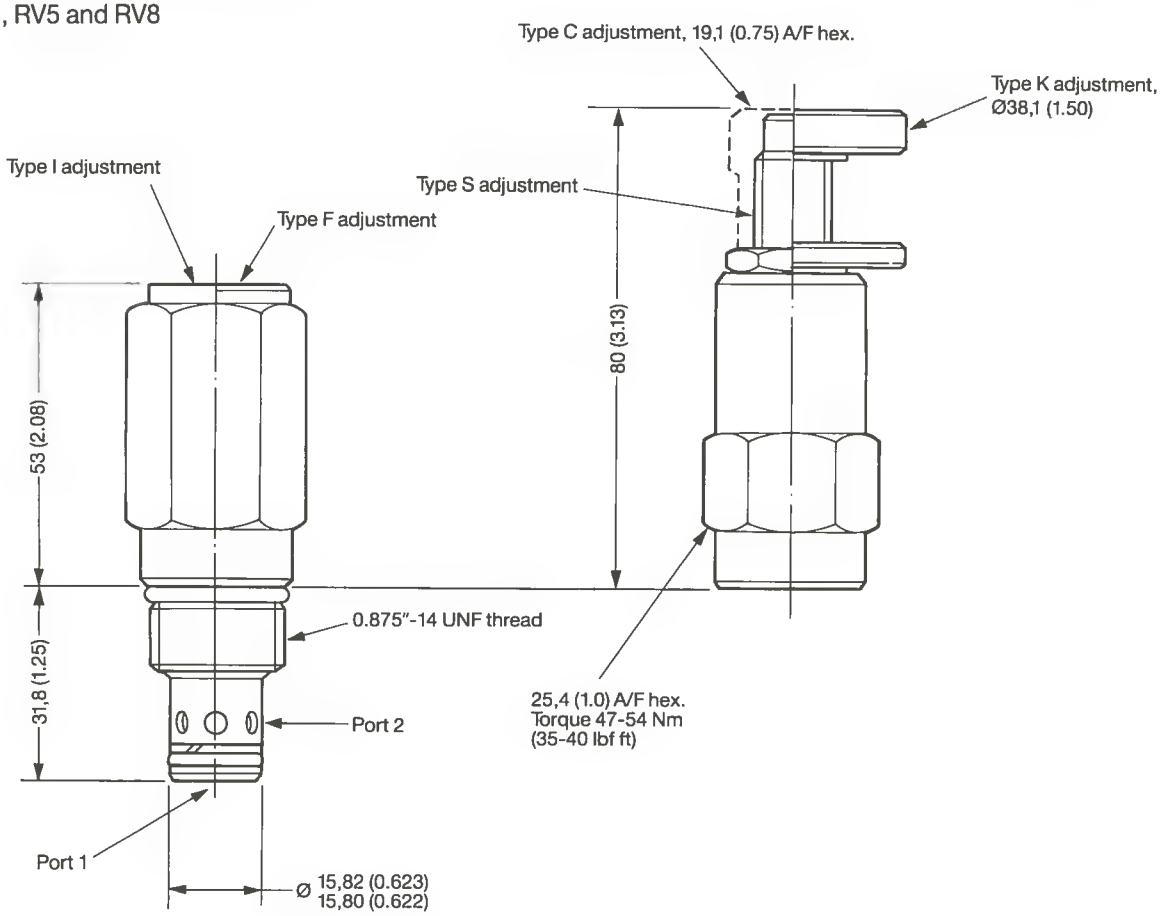
RV7



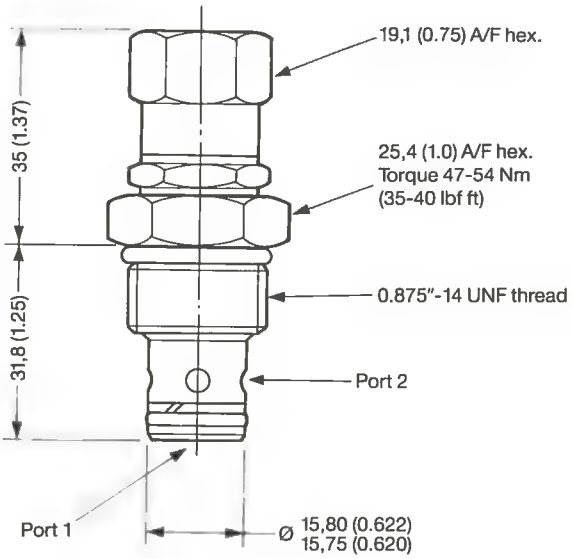
RV8



Installation dimensions in mm (inches)
RV1, RV2, RV3, RV5 and RV8



RV6 and RV7



Port data

For cartridge	Port	
	Identity	Function
RV1, 2, 5, 6 & 7	1	Pressure
	2	Tank
RV3 & 8	1	Tank
	2	Pressure

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

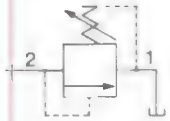
	Kit no.
RV*-10-*	SK-10-2
RV*-10V-*	SK-10V-2

Pressure relief valves

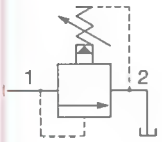
RV3/5-16

Functional symbols

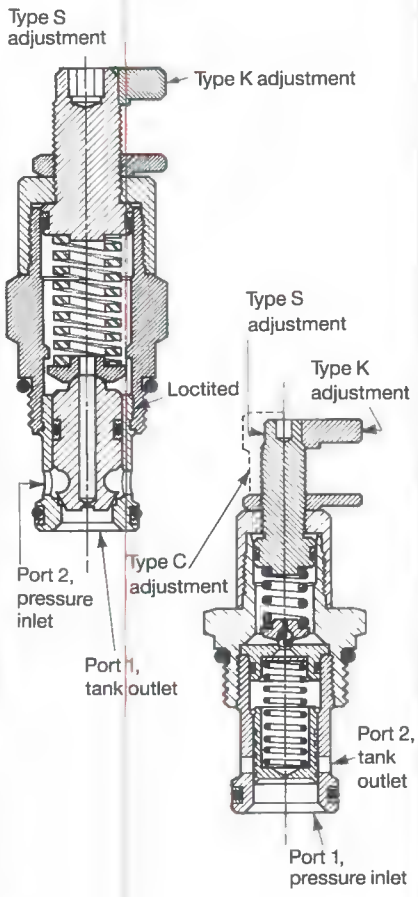
RV3



RV5



Typical sections



Model and ordering code

RV* -16(V)- * - ** - ** /**
1 | 2 3 4 5 6

1 Type
3 = Direct acting, poppet. Side inlet.
5 = Two-stage, spool. Bottom inlet.

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Cracking pressure setting adjustment
C = Cap and nut (option for RV5 only)
K = Knob
S = Screw

4 Form
0 = Cartridge only

In light-duty housing; 207 bar (3000 psi) max.
12T = With SAE 12 size ports

Continued in next column

In NFPA fatigue-rated housing; 207 bar (3000 psi) max.
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

5 Cracking pressure▲ adjustment range
RV3 models
13 = 3,45-89,6 bar (50-1300 psi)
RV5 models
30 = 10,35-206 bar (150-3000 psi)
For higher pressure models, consult your local sales engineer.
▲ Differential pressure, inlet-outlet

6 Factory-set cracking pressure
Within ranges in 5 above
Blank = Normal factory setting, at approx. mid-range.
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data

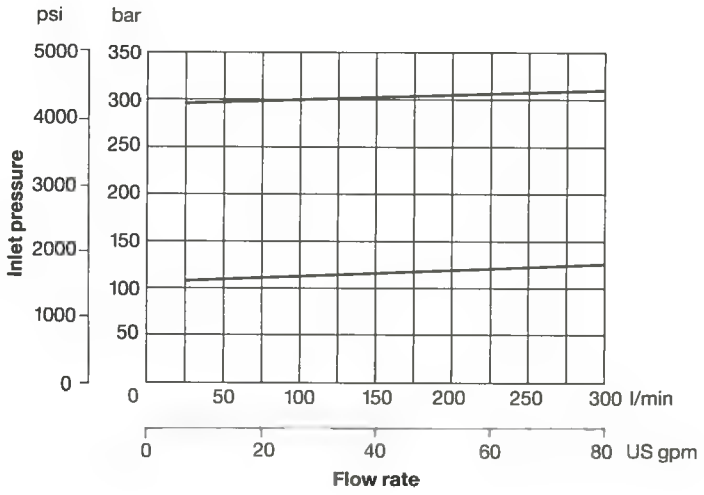
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports, cartridge only	207 bar (3000 psi). For higher pressure models, consult your local sales engineer
Cracking pressure adjustment range	See 5 and 6 in "Model code" above
Rated flow	303 l/min (80 US gpm)
Stable operation range	30-303 l/min (8-80 US gpm)
Pressure override characteristics	See graph on next page
Reseat pressure: RV3 RV5	 Approx. 90% of cracking pressure Approx. 5,2 bar (75 psi) below cracking pressure
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-2 For dimensions see page 247
Mass, cartridge only	0,71 kg (1.57 lb) approx.

Continued on next page

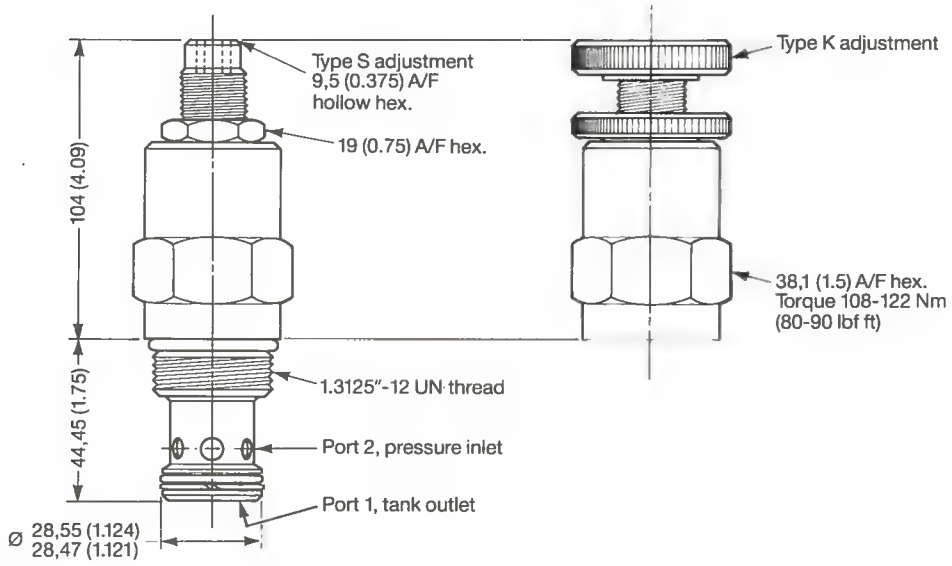
Housing options:	
Standard light-duty type	See page 255
Standard fatigue-rated type	See page 251
Customized types	Consult your local sales engineer
Spare parts	See next page

Pressure override characteristics
Cartridges only
With tank pressure at zero

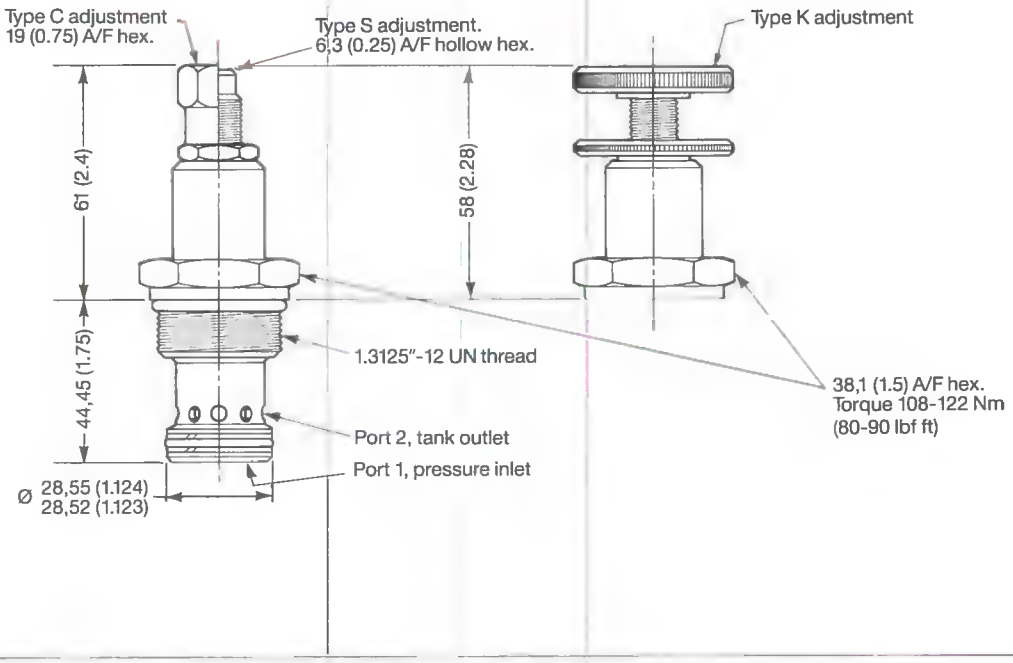


Installation dimensions in mm (inches)

RV3 models



RV5 models



Spare parts

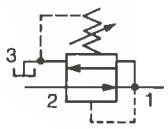
The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
RV3-16-*	SK-16-2
RV3-16V-*	SK-16V-2
RV5-16-*	SK2-16B-2
RV5-16V-*	SK2-16VB-2

Pressure reducing valves, with or without reverse relief function

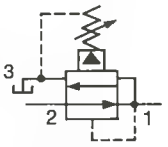
PRV1/2/4-10

Functional symbols

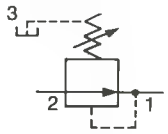
PRV1



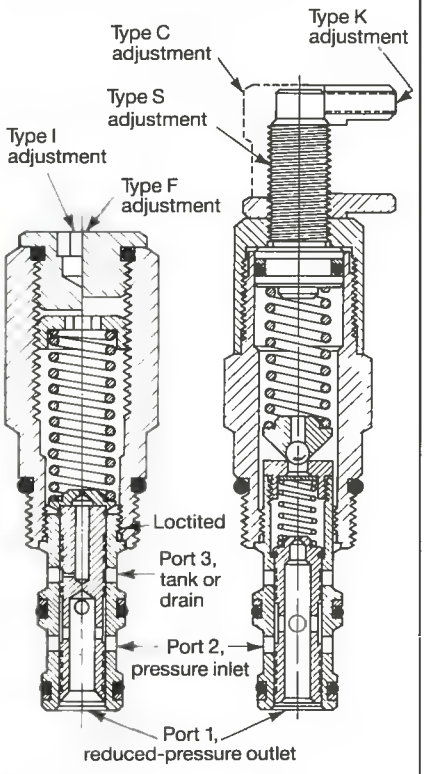
PRV2



PRV4



Typical sections
Adjustment options shown available for all cartridges



PRV1 PRV2
Similar construction for PRV4

Model and ordering code

PRV * -10(V)- * --**/****
[1] [2] [3] [4] [5] [6]

[1] **Type**
1, 2 or 4. See "Functional symbols".

[2] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[3] **Reduced-pressure adjustment**
C = Cap
F = Factory-set
I = Internal
K = Knob
S = Screw

[4] **Form**
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

[5] **Reduced-pressure adjustment range, bar (psi)**
At zero flow
PRV1 models
2 = 3,5-13,7 (50-200)
6 = 6,9-41,3 (100-600)
12 = 13,8-82,7 (200-1200)
24 = 27,6-165 (400-2400)

PRV2 models
3 = 3,5-20,7 (50-300)
20 = 6,9-138 (100-2000)
For higher pressure models, consult your local sales engineer.

PRV4 models
2 = 3,5-13,7 (50-200)
4 = 5,2-27,5 (75-400)
06 = 6,9-41,3 (100-600)
12 = 13,8-82,7 (200-1200)
24 = 27,6-165 (400-2400)

[6] **Factory-set reduced-pressure**
Within ranges in [5] above
Blank = Normal factory setting, at approx. mid-range.
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

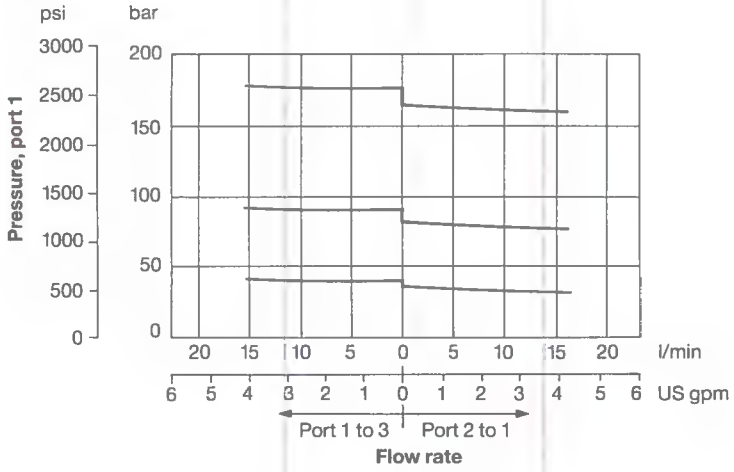
Max. pressure, all ports, cartridge only: PRV1 and PRV4 PRV2	 207 bar (3000 psi) 207 bar (3000 psi). For higher pressure models, consult your local sales engineer
Rated flow: PRV1 and PRV4 PRV2	 15 l/min (4 US gpm) 45 l/min (12 US gpm)
Reduced-pressure adjustment range	See "Model code" items [5] and [6] above
Reduced-pressure characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" and also page 266
Installation dimensions, cartridge only	See two pages on
Cavity size	C-10-3. For dimensions see page 247
Mass, cartridge only	0,24 kg (0.54 lb) approx.

Continued on next page

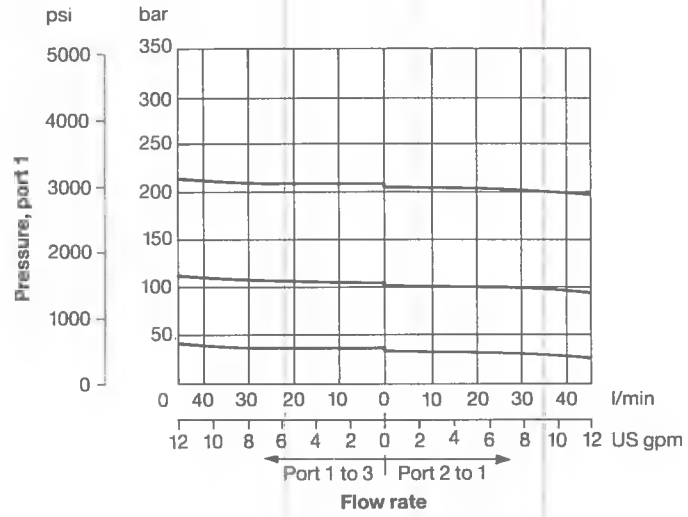
Housing options:	
Standard light-duty type	See page 257
Standard fatigue-rated type	See page 253
Customized types	Consult your local sales engineer
Spare parts	See next page

Reduced-pressure characteristics
Cartridges only

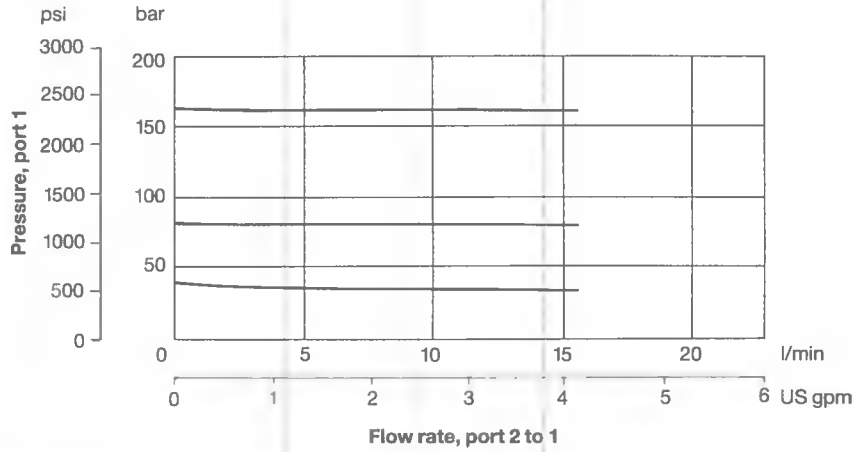
PRV1



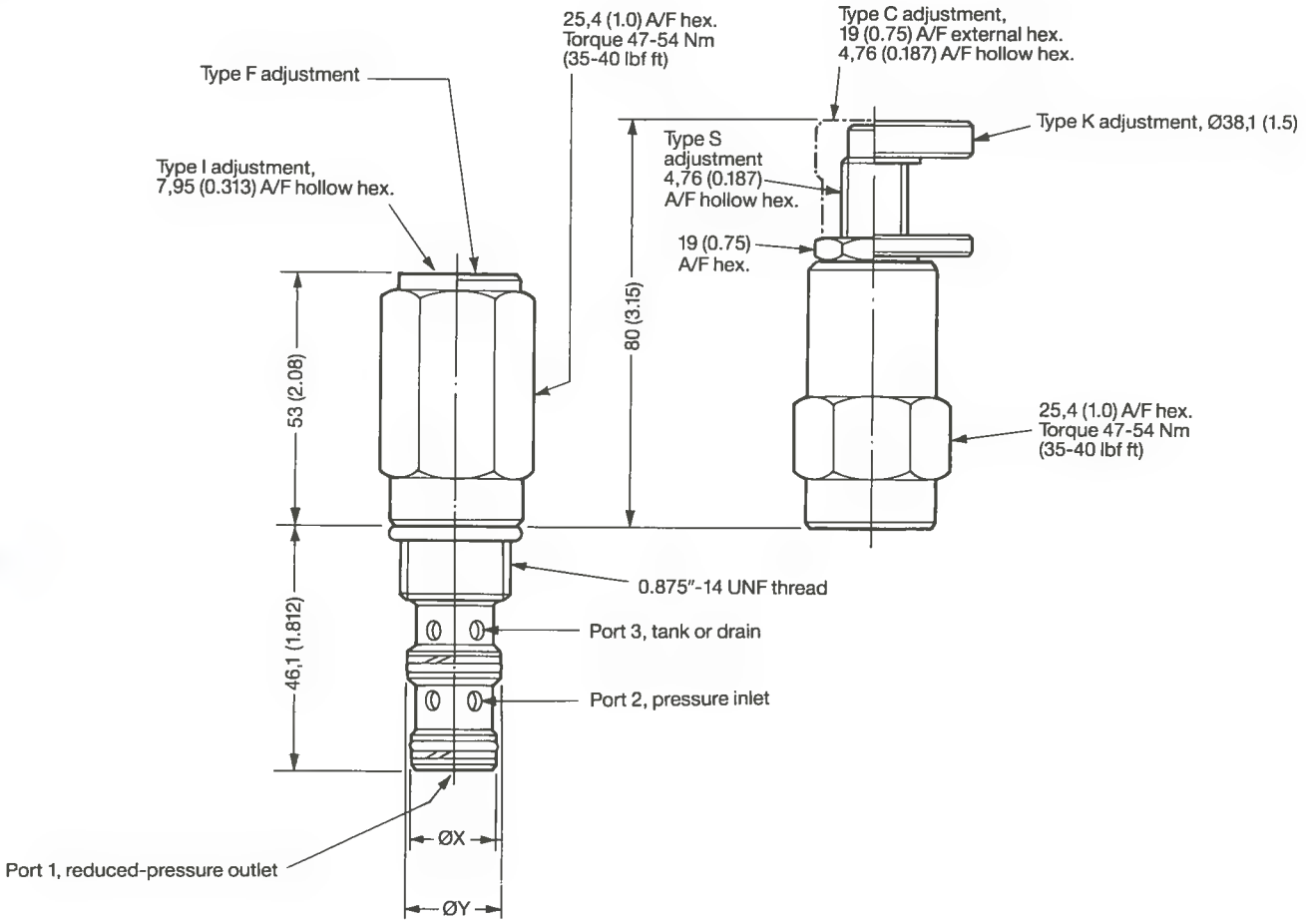
PRV2



PRV4



Installation dimensions in mm (inches)



Model	ØX	ØY
PRV1 & PRV2	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)
PRV4	15,82 (0.623) 15,80 (0.622)	17,42 (0.686) 17,40 (0.685)

Adjustment options shown available for all cartridges

Spare parts

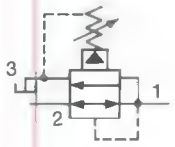
The only parts available are seal kits comprising external seals and back-up rings for:

	Kit no.
PRV*-10-*	SK-10-3
PRV*-10V-*	SK-10V-3

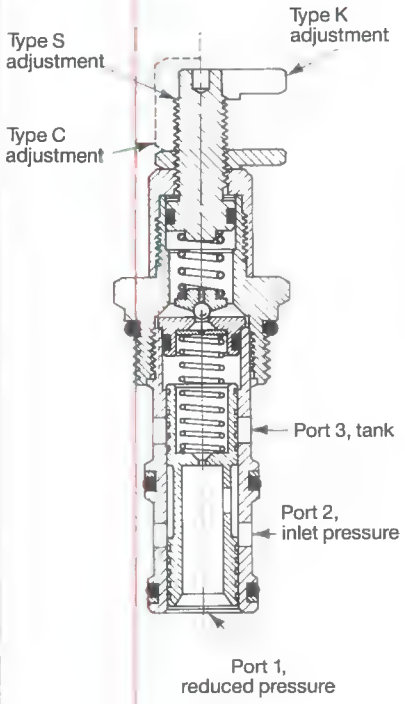
Pressure reducing and relieving valves, pilot operated series

PRV2-16

Functional symbol



Typical section



Model and ordering code

PRV2-16(V)- * --** /****
[1] [2] [3] [4] [5]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Reduced-pressure adjustment**
S = Screw
K = Knob
C = Cap

[3] **Form**
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

[4] **Reduced-pressure adjustment range, bar (psi)**
At zero flow
30 = 3,45-206 (50-3000)
For higher pressure models, consult your local sales engineer.

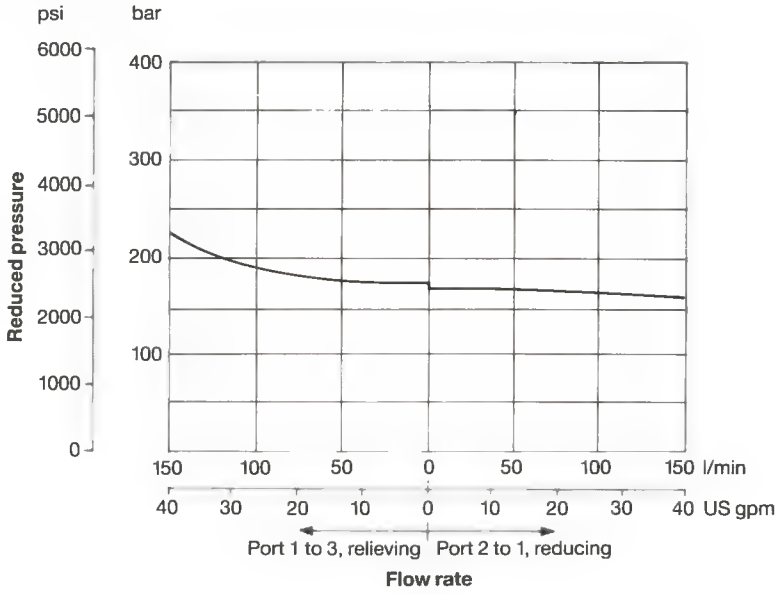
[5] **Factory-set reduced-pressure**
Within ranges in [4] above
Blank = Normal factory setting, at approx. mid-range.
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

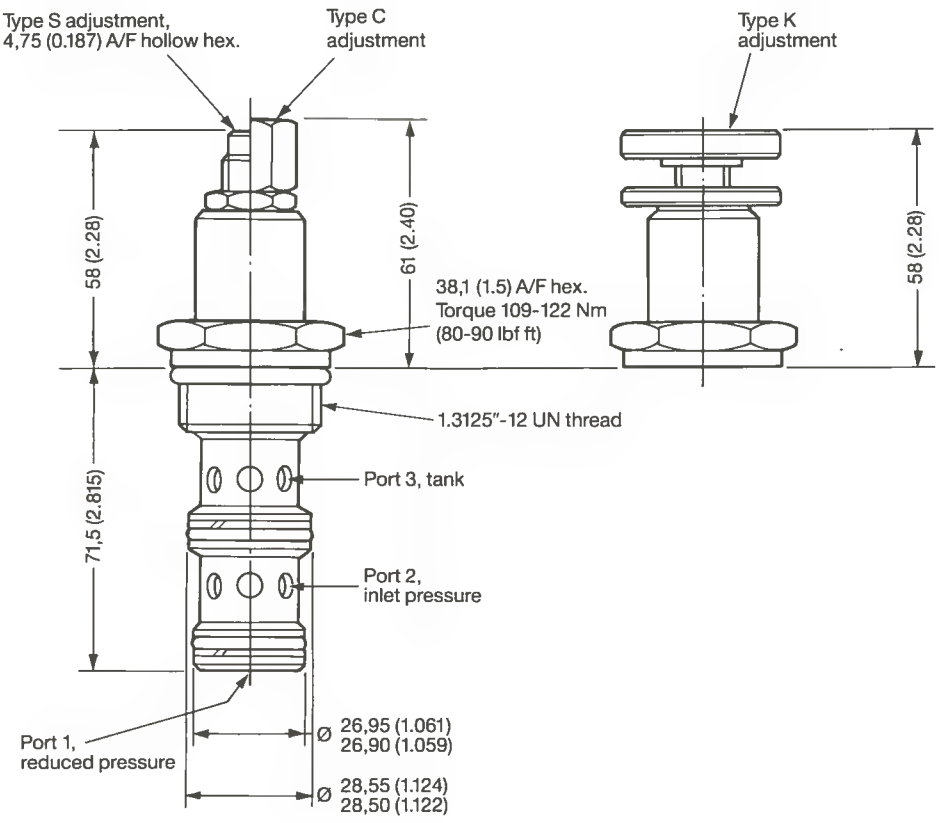
Max. pressure, all ports, cartridge only	207 bar (3000 psi). For higher pressure models, consult your local sales engineer.
Reduced-pressure adjustment range	See [4] in "Model code"
Rated flow	151 l/min (40 US gpm)
Reduced-pressure characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-3 For dimensions see page 247
Mass, cartridge only	0,4 kg (0.89 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 257 See page 253 Consult your local sales engineer
Spare parts	See next page

Reduced-pressure characteristics

Cartridges only



Installation dimensions in mm (inches)



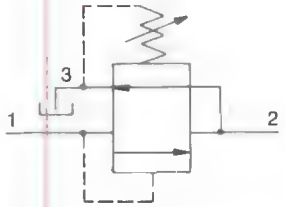
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PRV2-16-*	SK-16-3
PRV2-16V-*	SK-16V-3

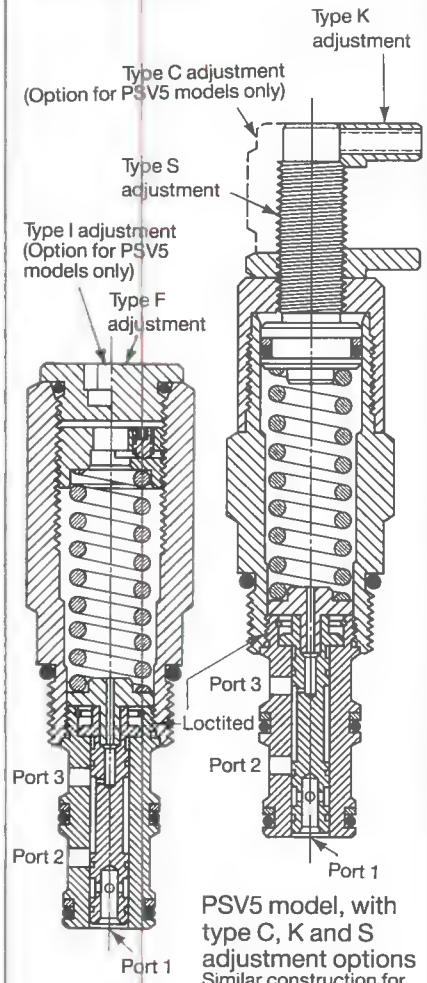
Pressure sequence valves, internally piloted, externally vented series

PSV1/5-10

Functional symbol



Typical sections



PSV5 model, with type C, K and S adjustment options
Similar construction for PSV1 models

PSV5 model, with type F and I adjustment options
Similar construction for PSV1 models

Model and ordering code

PSV * -10(V)- * - ** -/****
1 2 3 4 5 6

1 Rated flow
1 = 23 l/min (6 US gpm)
5 = 7,6 l/min (2 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Sequence pressure setting adjustment
C = Cap (option for PSV5 models only)
F = Factory-set
K = Knob
S = Screw
I = Internal (option for PSV5 models only)

4 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

Continued in next column

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

5 Sequence cracking pressure adjustment range
PSV1 models
2 = 3,45-13,7 bar (50-200 psi)
6 = 6,9-41,4 bar (100-600 psi)
12 = 13,8-82,7 bar (200-1200 psi)
24 = 27,6-165 bar (400-2400 psi)

PSV5 models
5 = 3,45-31,0 bar (50-450 psi)
9 = 6,9-62,0 bar (100-900 psi)
14 = 13,8-96,5 bar (200-1400 psi)
28 = 20,7-193 bar (300-2800 psi)
For higher pressure models, consult your local sales engioneer.

6 Factory-set sequence cracking pressure
Within ranges in 5 above
Blank = Normal factory setting, at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data

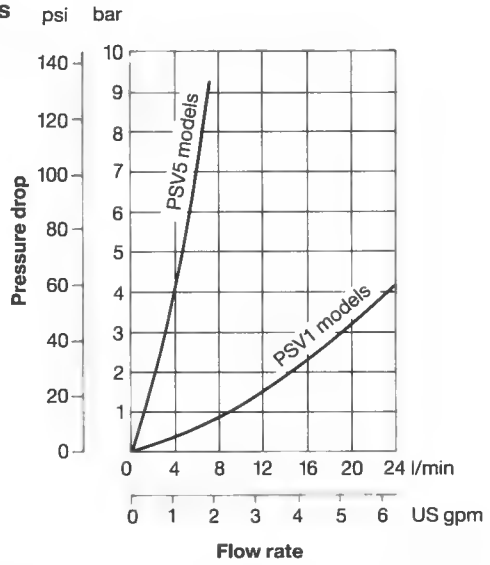
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports, cartridge only: PSV1 PSV5	 165 bar (2400 psi) 207 bar (3000 psi). For higher pressure models, consult your local sales engineer.
Rated flow	See 1 in "Model code" above
Sequence cracking pressure adjustment range	See 5 and 6 in "Model code" above
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-3 For dimensions see page 247
Mass, cartridge only	0,24 kg (0.53 lb) approx.

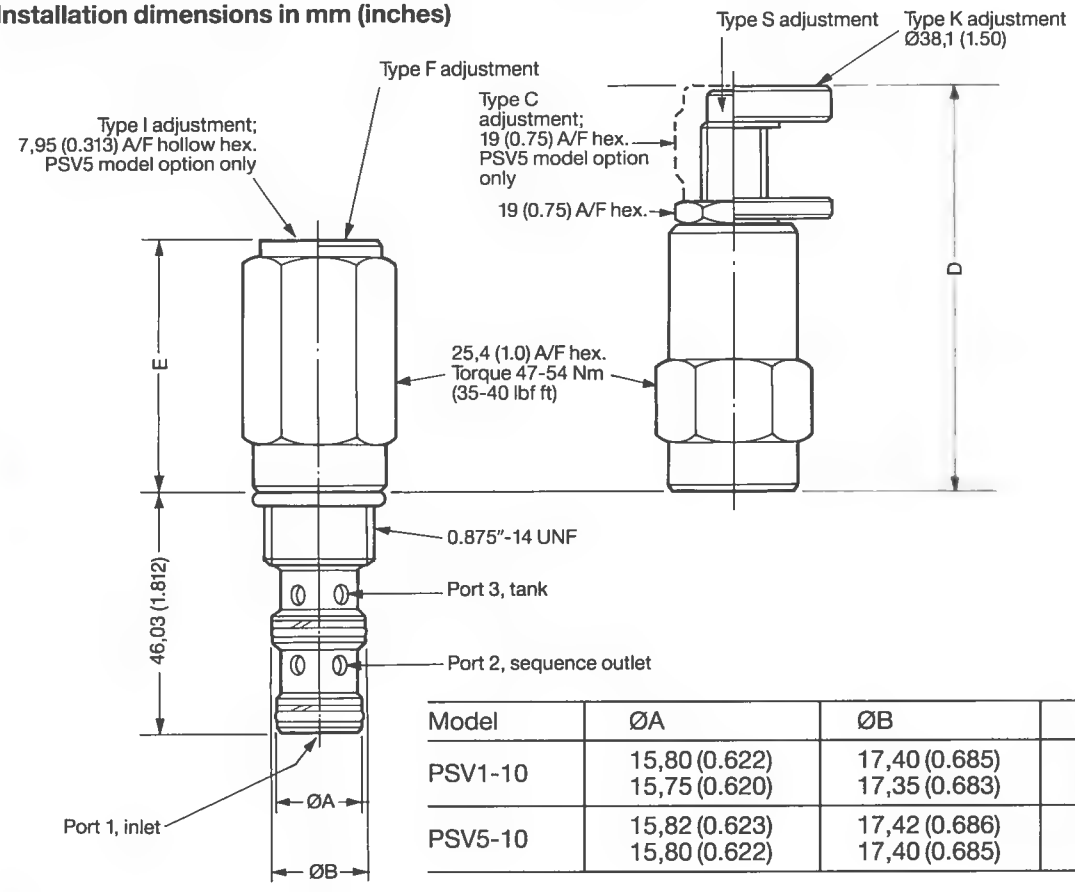
Continued on next page

Housing options:	
Standard light-duty type	See page 257
Standard fatigue-rated type	See page 253
Customized types	Consult your local sales engineer
Spare parts	See below

Pressure drop characteristics
Cartridges only
Port 1 to 2, valve fully open, spring omitted



Installation dimensions in mm (inches)



Model	ØA	ØB	D	E
PSV1-10	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)	80 (3.15)	50 (1.97)
PSV5-10	15,82 (0.623) 15,80 (0.622)	17,42 (0.686) 17,40 (0.685)	85 (3.35)	58 (2.28)

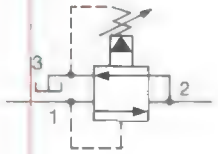
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PSV*-10-*	SK-10-3
PSV*-10V-*	SK-10V-3

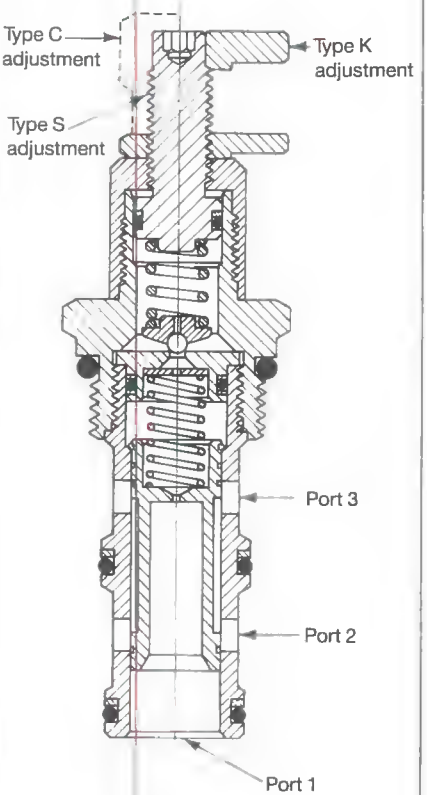
Pressure sequence valves, two-stage externally vented series

PSV1-16

Functional symbol



Typical section



Model and ordering code

PSV1-16(V)- * -*-**/****
1 2 3 4 5

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Sequence pressure setting adjustment
C = Cap
K = Knob
S = Screw

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

4 Sequence cracking pressure adjustment range
30 = 3,45-206 bar (50-3000 psi)
For higher pressure models, consult your local sales engineer.

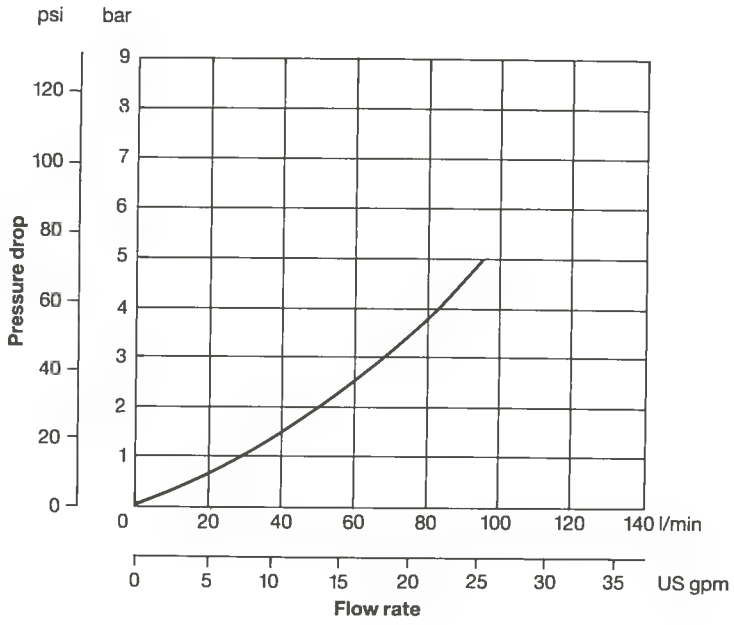
5 Factory-set sequence cracking pressure
Within ranges in 4 above
Blank = Normal factory setting, at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

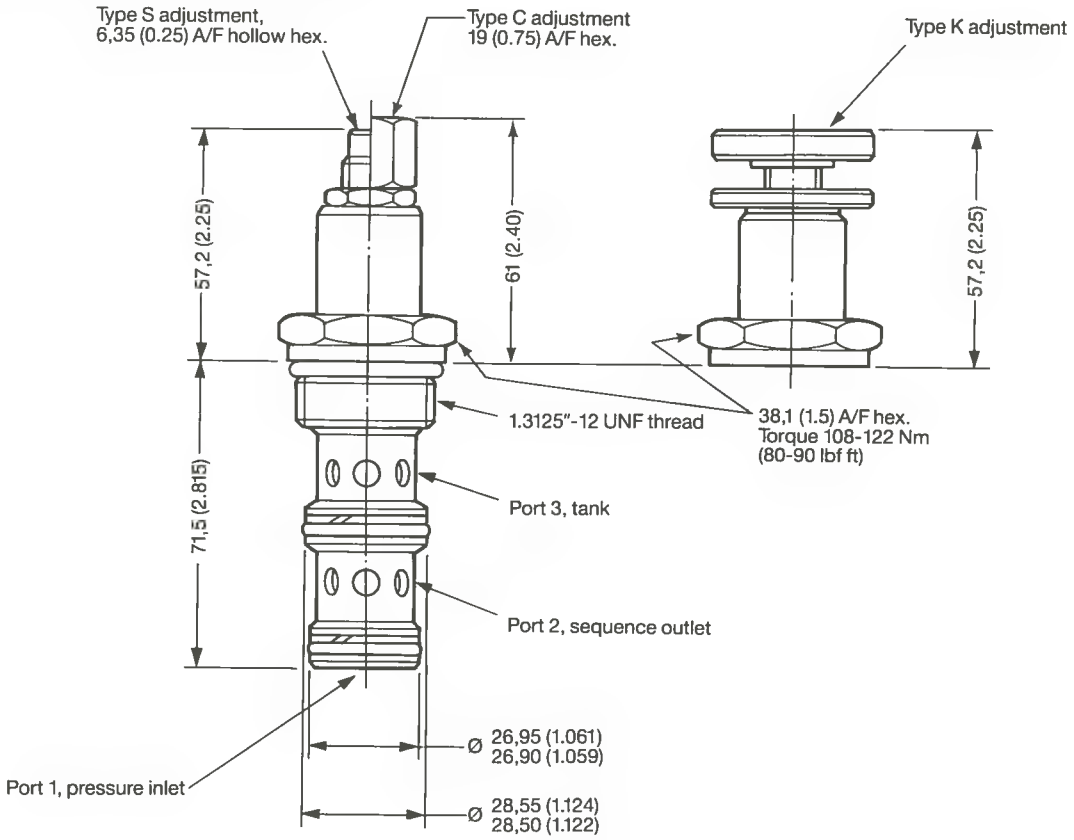
Max. pressure, all ports, cartridge only	207 bar (3000 psi). For higher pressure models, consult your local sales engineer.
Rated flow	95 l/min (25 US gpm)
Sequence cracking pressure adjustment range	See 4 and 5 in "Model code" above
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 1 in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-3 For dimensions see page 247
Mass, cartridge only	0,40 kg (0.89 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 257 See page 253 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics

Cartridges only
Port 1 to 2, valve fully open, spring omitted



Installation dimensions in mm (inches)



Spare parts

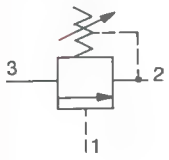
The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PSV1-16-*	SK-16-3
PSV1-16V-*	SK-16V-3

Pressure sequence valves, direct-acting series with or without external pilot port

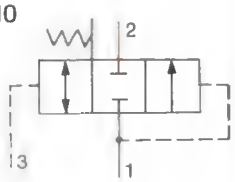
PSV2/3/4/7-10

Functional symbols

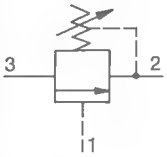
PSV2-10



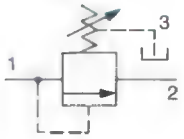
PSV3-10



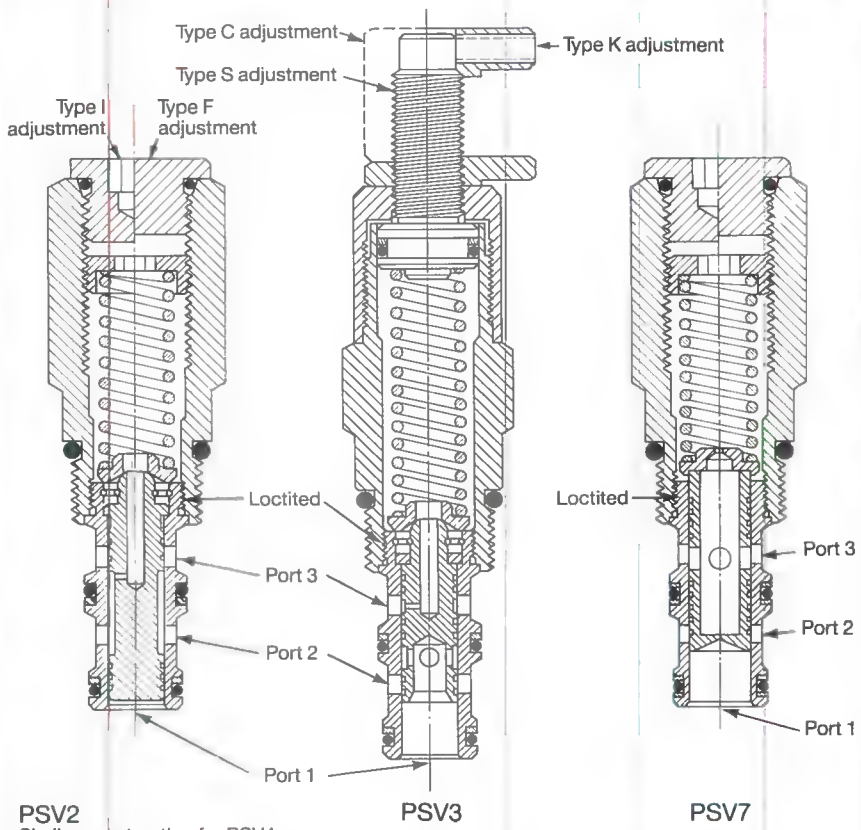
PSV4-10



PSV7-10



Typical sections



Model and ordering code

PSV*-10(V)- *- ** - **/**

1 2 3 4 5 6

1 Type
2, 3, 4 and 7. See "Functional symbols" section.

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Sequence pressure setting adjustment
C = Cap
F = Factory-set
I = Internal
K = Knob
S = Screw

4 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

5 Sequence cracking pressure adjustment range, bar (psi)
PSV2 models
2 = 3,45-13,7 (50-200)
6 = 6,90-41,3 (100-600)
12 = 13,8-82,7 (200-1200)
24 = 27,6-165 (400-2400)

PSV3 models
2 = 3,45-13,7 (50-200)
4 = 5,20-27,5 (75-400)
6 = 6,90-41,3 (100-600)
12 = 13,8-82,7 (200-1200)
24 = 27,6-165 (400-2400)

Continued on next page

PSV4 models
5 = 3,45-31,0 (50-450)
9 = 6,90-62,0 (100-900)
14 = 13,8-96,5 (200-1400)
28 = 20,7-193,1 (300-2800)
For higher pressure models, consult your local sales engineer.

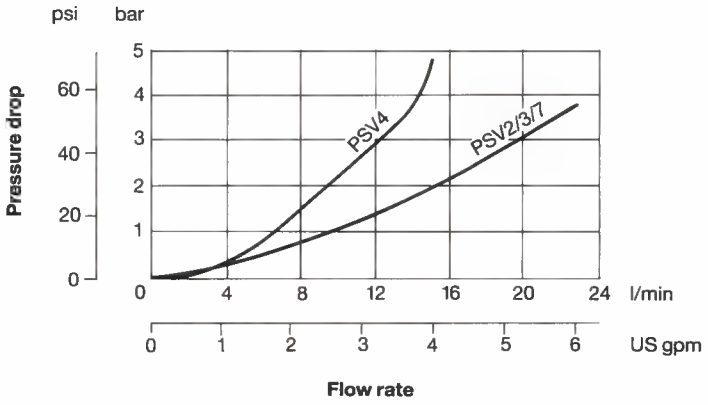
PSV7 models
2 = 3,45-10,3 (50-150)
3 = 5,20-20,6 (75-300)
5 = 6,90-31,0 (100-450)
10 = 13,8-65,5 (200-950)
18 = 20,7-124 (300-1800)

[6] Factory-set sequence cracking pressure
Within ranges in [5]
Blank = Normal factory setting, at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

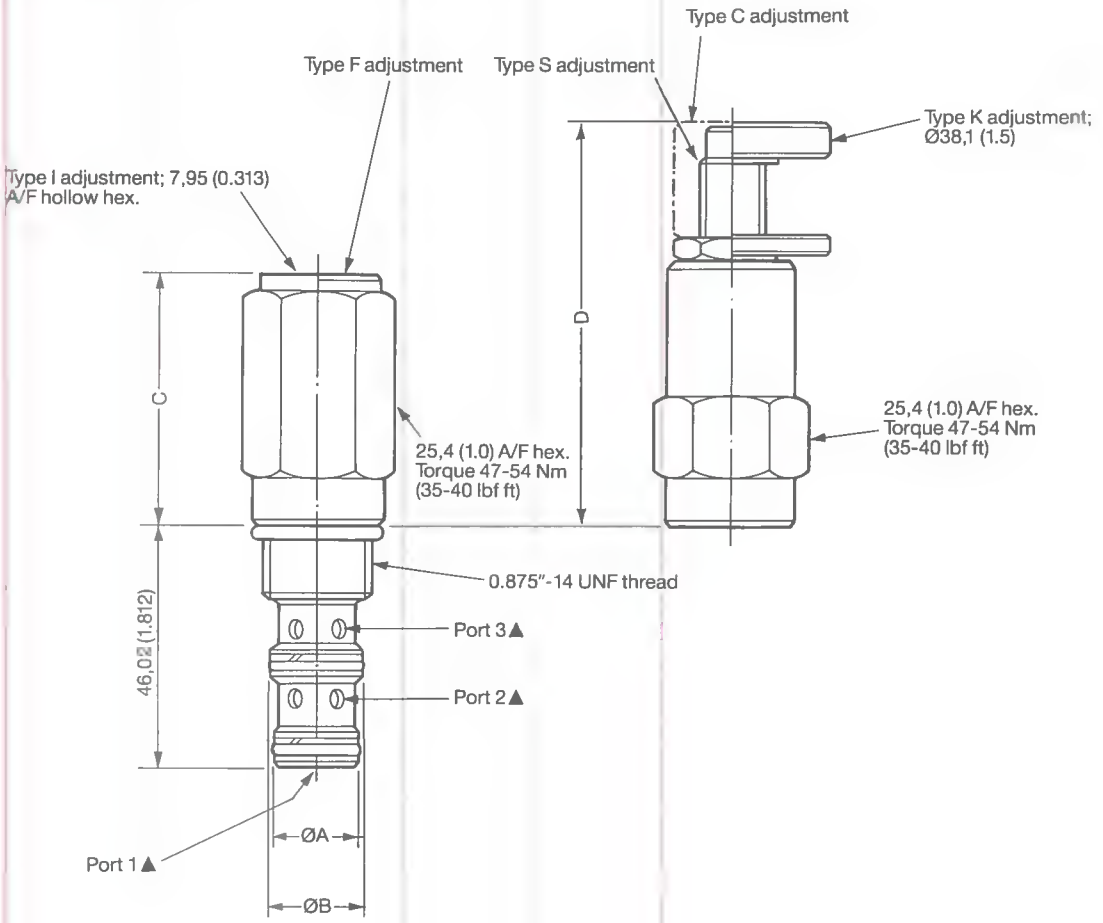
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports, cartridge only:	
PSV2/3	165 bar (2400 psi)
PSV4	207 bar (3000 psi). For higher pressure models, consult your local sales engineer.
PSV7	124 bar (1800 psi)
Rated flow:	
PSV2/3/7	23 l/min (6 US gpm)
PSV4	15 l/min (4 US gpm)
Sequence cracking pressure adjustment range	See [5] and [6] in "Model code" on previous page and above
Pressure drop characteristics	See graph below
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-3 For dimensions see page 247
Mass, cartridge only	0,25 kg (0.54 lb) approx.
Housing options:	
Standard light-duty type	See page 257
Standard fatigue-rated type	See page 253
Customized types	Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only
Valve fully open, spring omitted



Installation dimensions in mm (inches)



Models	ØA	ØB	C	D
PSV2/3/4	15,82 (0.623) 15,80 (0.622)	17,42 (0.686) 17,40 (0.685)	58 (2.28)	85 (3.34)
PSV7	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)	53 (2.08)	80 (3.15)

▲ See "Functional symbols" two pages back

Spare parts

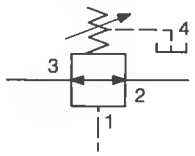
The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PSV2/3/4-10-*	SK-10-3
PSV2/3/4-10V-*	SK-10V-3
PSV7-10-*	SK2-10-3
PSV7-10V-*	SK2-10V-3

Pressure sequence valves, direct-acting series, externally piloted and drained

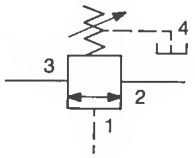
PSV8/10-10

Functional symbols

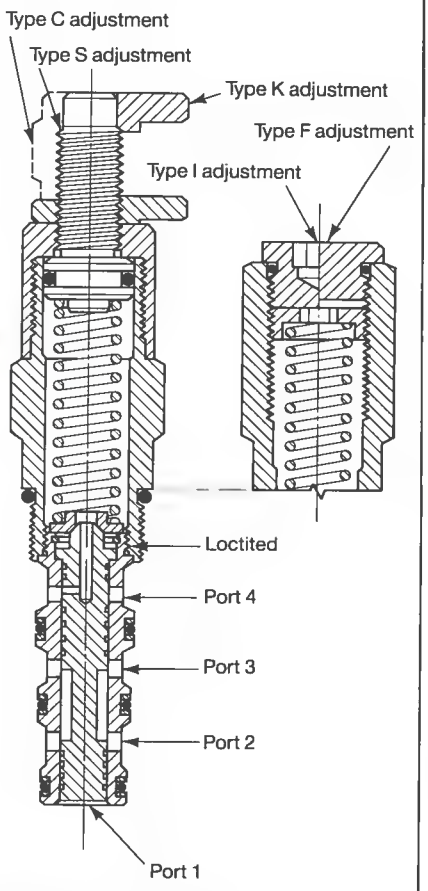
PSV8-10



PSV10-10



Typical sections



PSV8
Similar construction for PSV10

Model and ordering code

PSV-10(V)-* - ***-**/****
1 2 3 4 5 6

1 Type
8 or 10. See "Functional symbols".

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Sequence pressure setting adjustment
C = Cap
F = Factory-set
I = Internal
K = Knob
S = Screw

4 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
Continued in next column
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

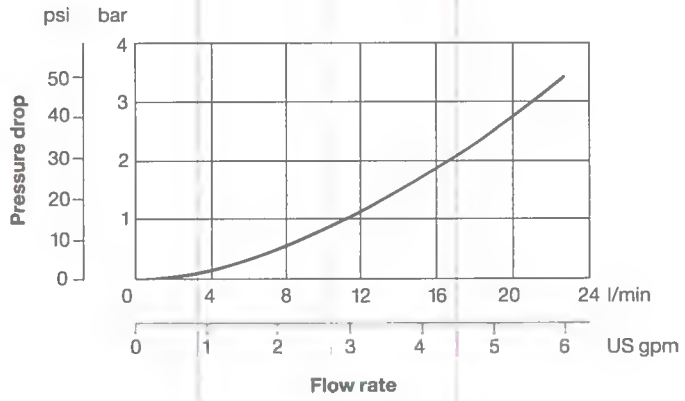
5 Sequence cracking pressure adjustment range
2 = 3,45-13,7 bar (50-200 psi)
4 = 5,20-27,5 bar (75-400 psi)
6 = 6,90-41,3 bar (100-600 psi)
12 = 13,8-82,7 bar (200-1200 psi)
24 = 27,6-165 bar (400-2400 psi)

6 Factory-set sequence cracking pressure
Within ranges in 5 above
Blank = Normal factory setting, at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

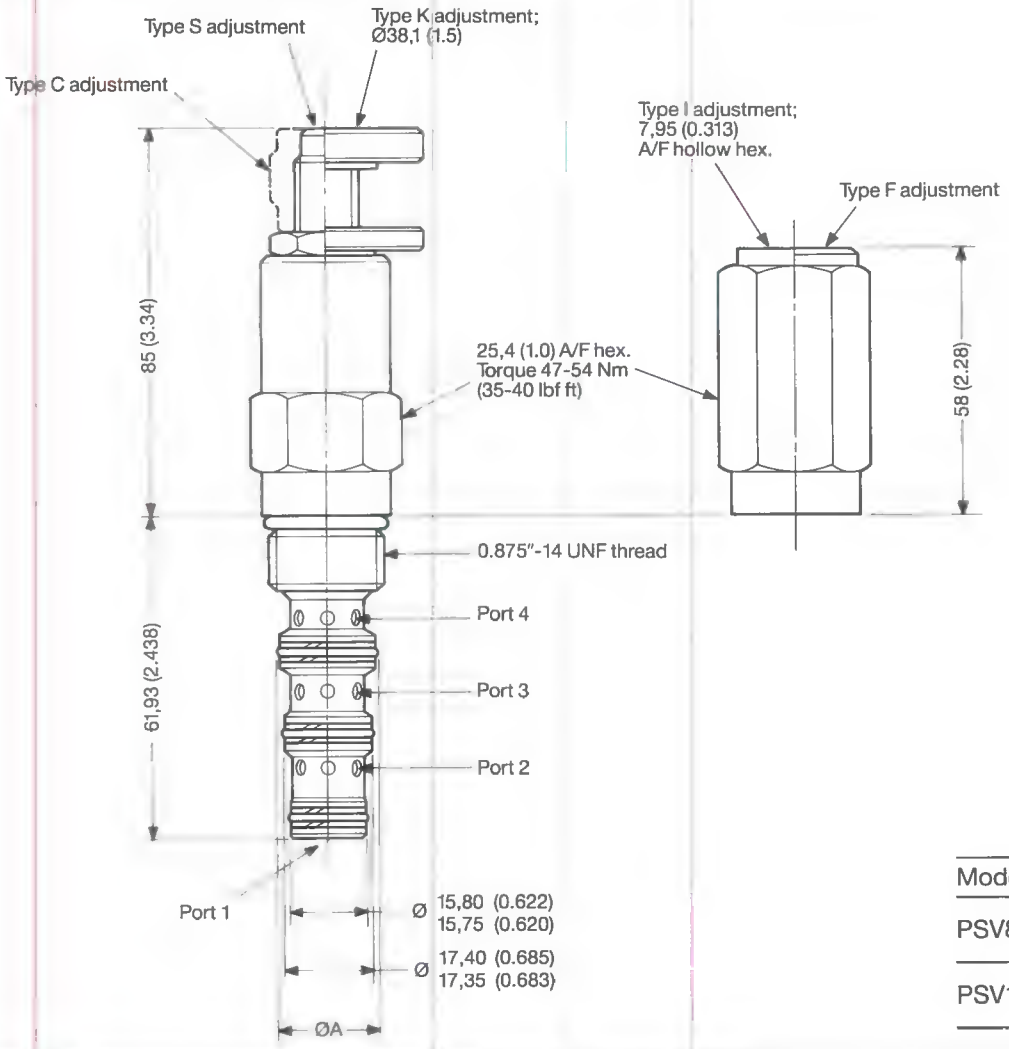
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)
Rated flow	23 l/min (6 US gpm)
Sequence cracking pressure adjustment range	See 5 and 6 in "Model code" above
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-4 For dimensions see page 247
Mass	0,27 kg (0.6 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 258 See page 254 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only
Port 3 to 2, valve fully open, spring omitted



Installation dimensions in mm (inches)



Model	ØA
PSV8	19,00 (0.748) 18,97 (0.747)
PSV10	18,97 (0.747) 18,92 (0.745)

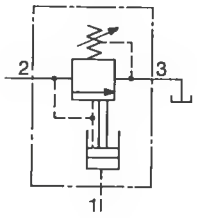
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PSV8/10-10-*	SK2-10-4
PSV8/10-10V-*	SK2-10V-4

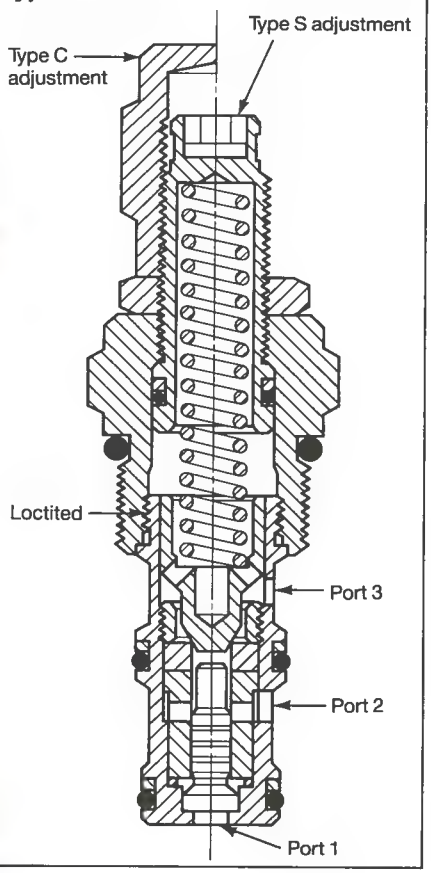
Pilot-stage cartridges for pump unloading valves

PUV3-10

Functional symbol



Typical section



Model and ordering code

PUV3-10(V)--***-****
1 2 3 4

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Pressure setting adjustment
C = Cap
S = Screw

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

Continued in next column

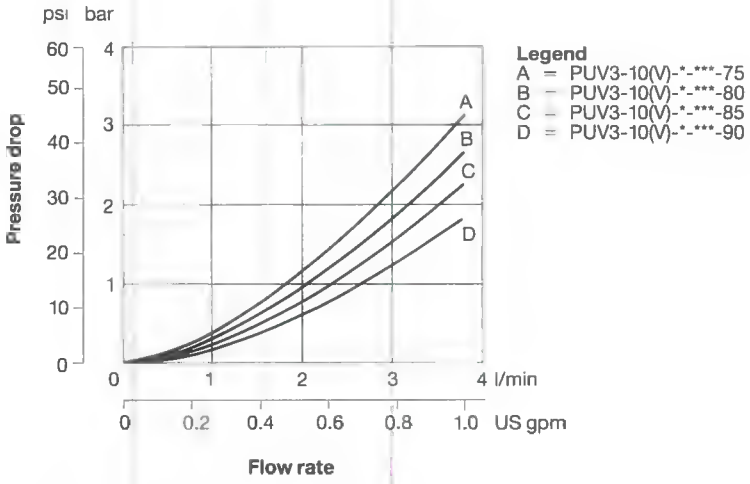
In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

4 Loading (closing) pressure, as percentage of unloading pressure
See "Unloading pressure adjustment range" in table below
90 = 90%
85 = 85%
80 = 80%
75 = 75%

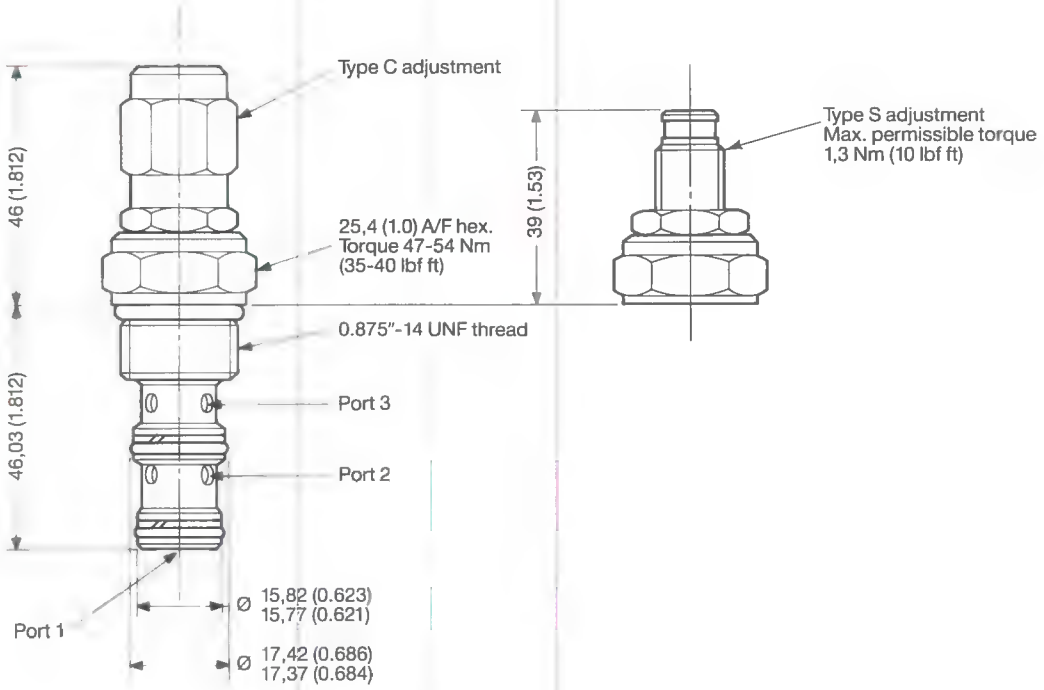
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Usage	Typically to act as the pilot stage of a two-stage pump unloader for an accumulator system. The main-stage can be a DPS2-**(V)-V-F cartridge (see page 242). Your local sales engineer will be pleased to give advice about forming an appropriate MCD valve package.
Max. pressure, all ports	207 bar (3000 psi)
Rated flow	3,8 l/min (1.0 US gpm)
Unloading pressure adjustment range	2,07-206 bar (30-3000 psi)
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 1 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-3 For dimensions see page 247
Mass, cartridge only	0,15 kg (0.33 lb)
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 257 See page 253 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only
Piloted fully open



Installation dimensions in mm (inches)



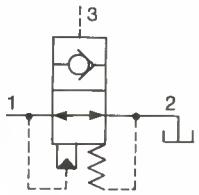
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PUV3-10-*	SK-10-3
PUV3-10V-*	SK-10V-3

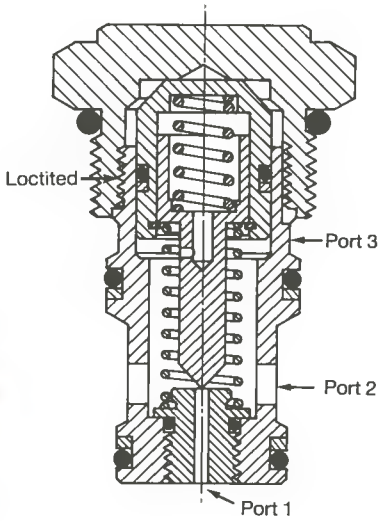
Accumulator discharge valves

ADV1-16

Functional symbol



Typical section



Model and ordering code

ADV1-16(V)-*-100**

[1] [2]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Form**
0 = Cartridge only

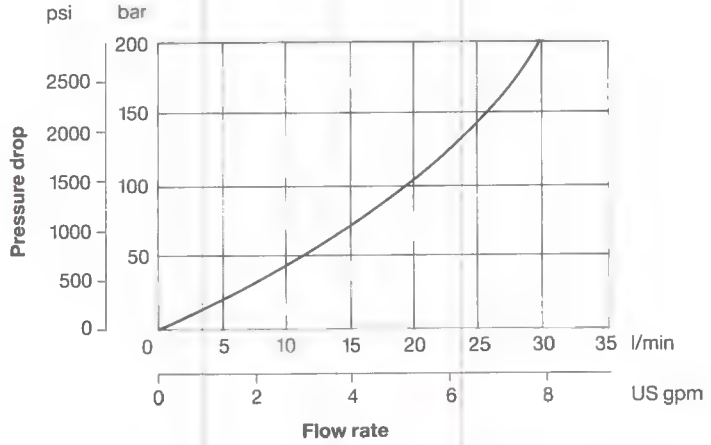
In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

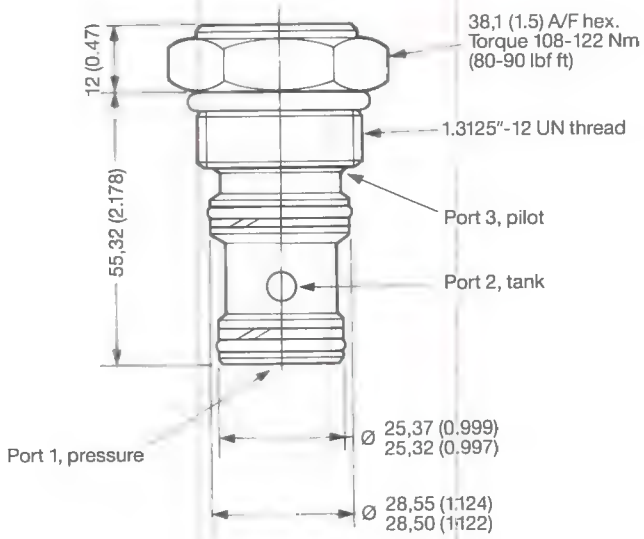
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure: Ports 1 and 3 Port 2, tank	 207 bar (3000 psi) <10% of pilot pressure, at port 3
Rated flow	30 l/min (8 US gpm)
Operating pressure range, at port 1	5,5-207 bar (80-3000 psi)
Min. pilot pressure, at port 3	4,2 bar (60 psi)
Pilot area ratio, port 3 : port 1	100 : 1
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-3S For dimensions see page 247
Mass, cartridge only	0,28 kg (0.62 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 256 See page 252 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only
Port 3 pilot pressure = 0



Installation dimensions in mm (inches)



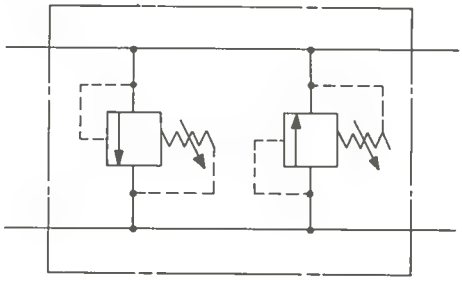
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
ADV1-16-***	SK-16-3S
ADV1-16V-***	SK-16V-3S

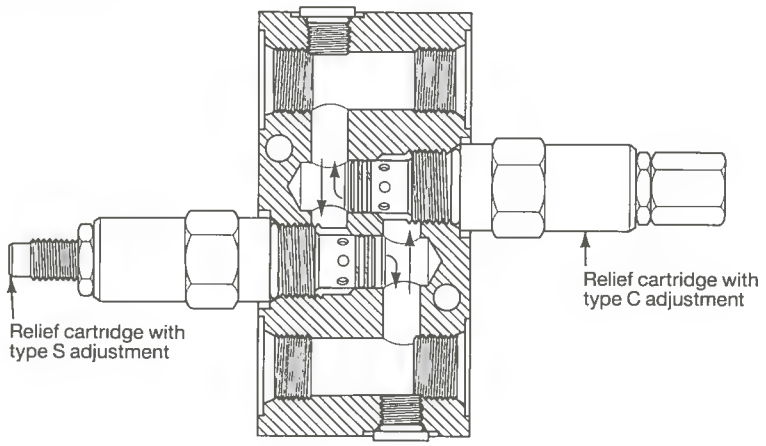
Cross-line relief valves, adjustable series

CRV3-10

Functional symbol



Typical section



Model and ordering code

CRV3-10(V)- * -8T-25/**
1 2 3

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Cracking pressure setting adjustment▲
C = Cap
F = Factory-set
S = Screw

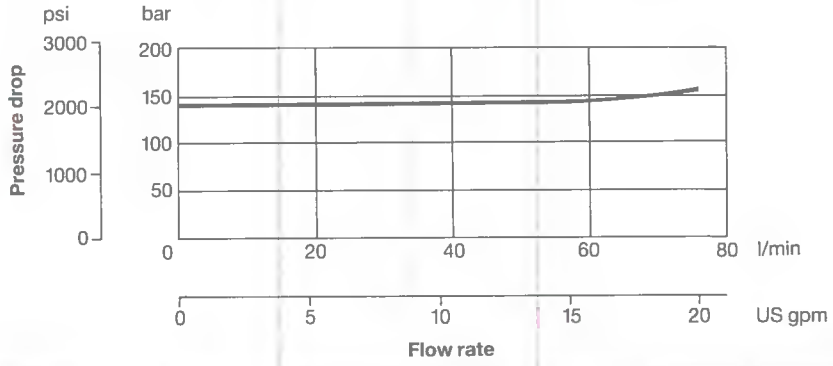
3 Factory-set cracking pressure▲
Blank = Normal factory setting, at approx. mid-range, see "Cracking pressure adjustment range" in "Operating data" table below.
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

▲ Assumes both cartridges are identical and set at the same pressure. Consult your local sales engineer if they are to be different.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

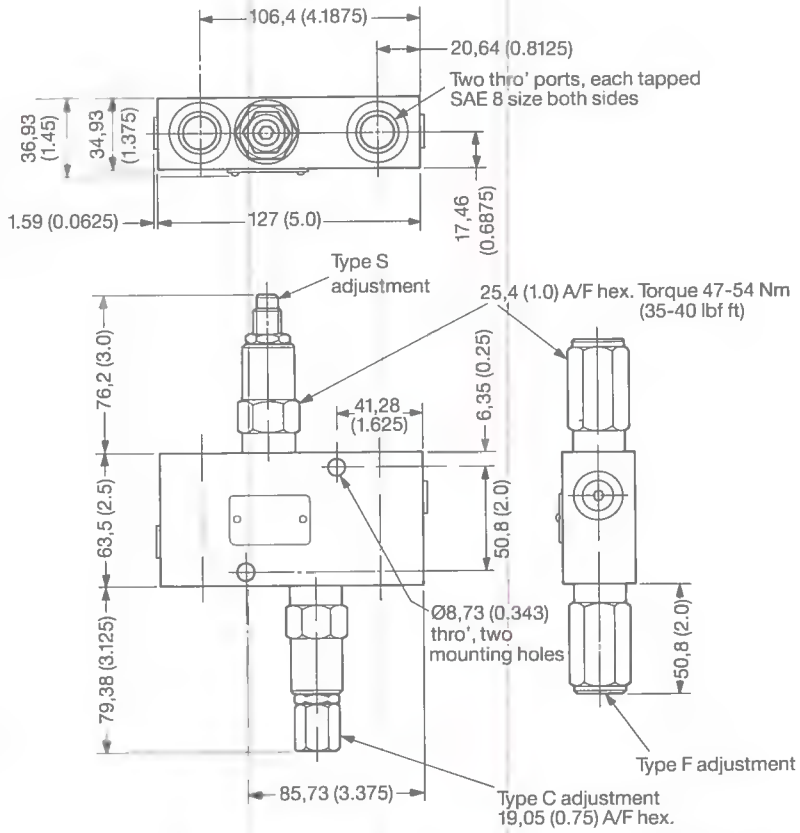
Max. pressure, all ports	207 bar (3000 psi), in light duty housing. For higher pressure models, consult your local sales engineer.
Rated flow	76 l/min (20 US gpm)
Cracking pressure adjustment range	17,3-172 bar (250-2500 psi)
Re-seat pressure	Approx. 90% of set cracking pressure
Pressure override characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 1 in "Model code" above, and also page 266
Installation dimensions	See next page
Mass	1,4 kg (3.08 lb) approx.
Spare parts	See next page

Pressure override characteristics
At a typical setting



Installation dimensions in mm (inches)

3rd angle projection



Spare parts

The only parts available are:

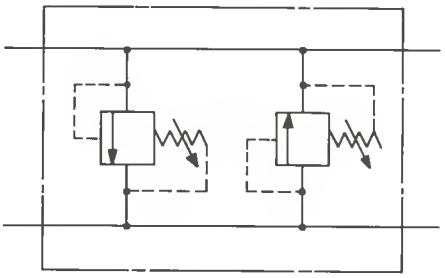
a. Seal kits comprising external seals and back-up rings, one relevant kit per cartridge, for:	Kit no.
CRV3-10-*	SK2-10B-2
CRV3-10V-*	SK2-10VB-2
b. Relief valve cartridge (for full details see RV8A-10 models on page 84), two per valve ▲, for:	Cartridge designation
CRV3-10-C-**-25/**	RV8A-10-C-0-25/**
CRV3-10V-C-**-25/**	RV8A-10V-C-0-25/**
CRV3-10-F-**-25/**	RV8A-10-F-0-25/**
CRV3-10V-F-**-25/**	RV8A-10V-F-0-25/**
CRV3-10-S-**-25/**	RV8A-10-S-0-25/**
CRV3-10V-S-**-25/**	RV8A-10V-S-0-25/**

Note: Bold-faced asterisks denote common characteristics in valve and cartridges.
▲ Assumes both cartridges factory-set to the same pressure.

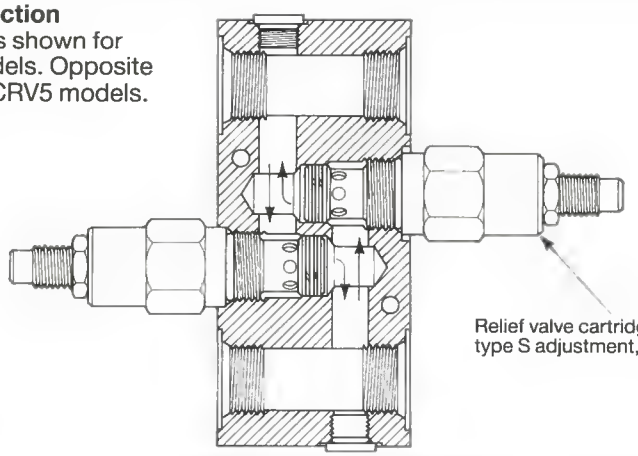
Cross-line relief valves, adjustable series

CRV3/5-16

Functional symbol



Typical section
Flow paths shown for CRV3 models. Opposite paths for CRV5 models.



Model and ordering code

CRV*-16(V)-S-16T-/****
1 2 3 4

1 Type
3 = Two-stage, poppet type
5 = Two-stage, spool type

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

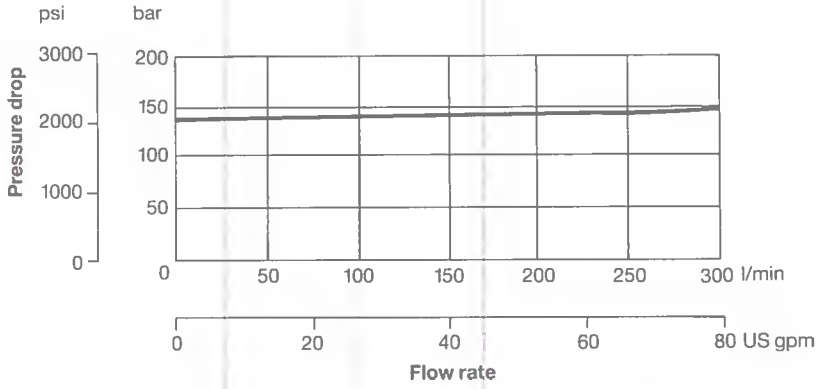
3 Cracking pressure adjustment range
25 = 17,3-172 bar (250-2500 psi), CRV3 models
30 = 3,45-206 bar (50-3000 psi), CRV5 models

4 Factory-set cracking pressure▲
Blank = Normal factory setting, at approx. mid-range, see 3 above
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.
▲ Assumes both cartridges are identical and set at the same pressure. Consult your local sales engineer if they are to be different.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

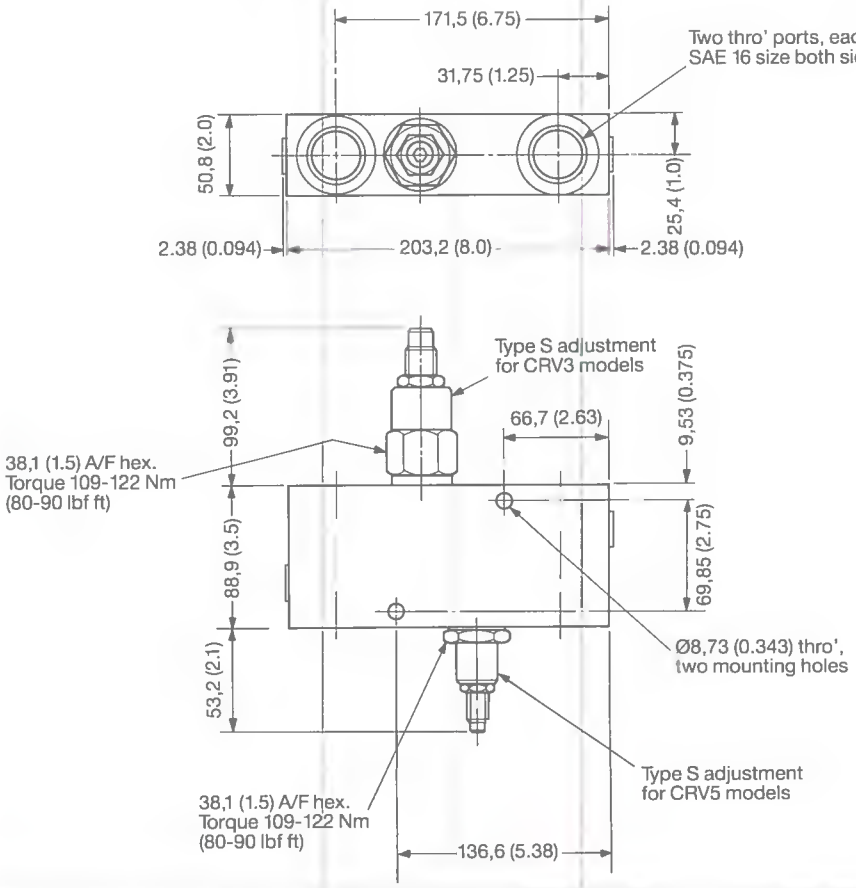
Max. pressure, all ports	207 bar (3000 psi), in light duty housing. For higher pressure models, consult your local sales engineer.
Rated flow	303 l/min (80 US gpm)
Cracking pressure adjustment range	See 3 and 4 in "Model code" above
Re-seat pressure: CRV3-16 CRV5-16	 Approx. 90% of set cracking pressure Approx. 5,2 bar (75 psi)
Pressure override characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions	See next page
Mass	2,5 kg (5.5 lb) approx.
Spare parts	See next page

Pressure override characteristics
At a typical setting



Installation dimensions in mm (inches)

3rd angle projection



Spare parts

The only parts available are:

a. Seal kits comprising external seals and back-up rings, one relevant kit per cartridge, for:	Kit no.
CRV*-16-S	SK2-16B-2
CRV*-16V-S	SK2-16VB-2
b. Relief valve cartridge (for full details see RV3A and RV5 models on page 84), two per valve ▲, for:	Cartridge designation
CRV3-16-S-***-25/**	RV3A-16-S-0-25/**
CRV3-16V-S-***-25/**	RV3A-16V-S-0-25/**
CRV5-16-S-***-30/**	RV5-16-S-0-30/**
CRV5-16V-S-***-30/**	RV5-16V-S-0-30/**

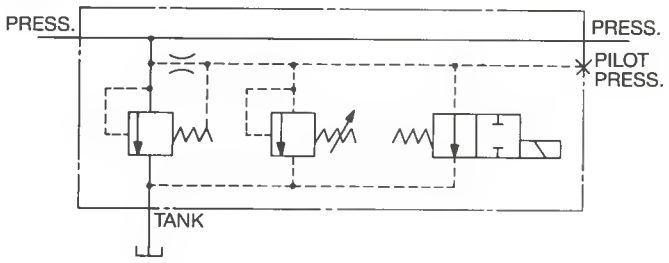
Note: Bold-faced asterisks denote common characteristics in valve and cartridges
▲ Assumes both cartridges factory-set to the same pressure

Adjustable relief valves with solenoid operated venting, normally-open and normally-closed series

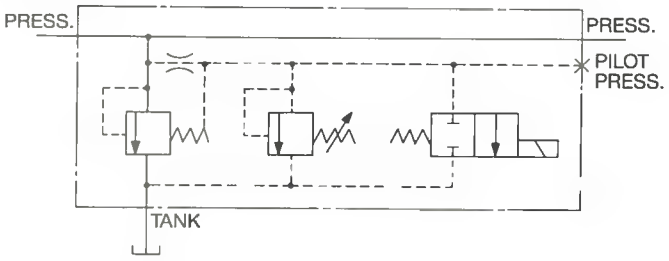
SRV1-16

Functional symbols

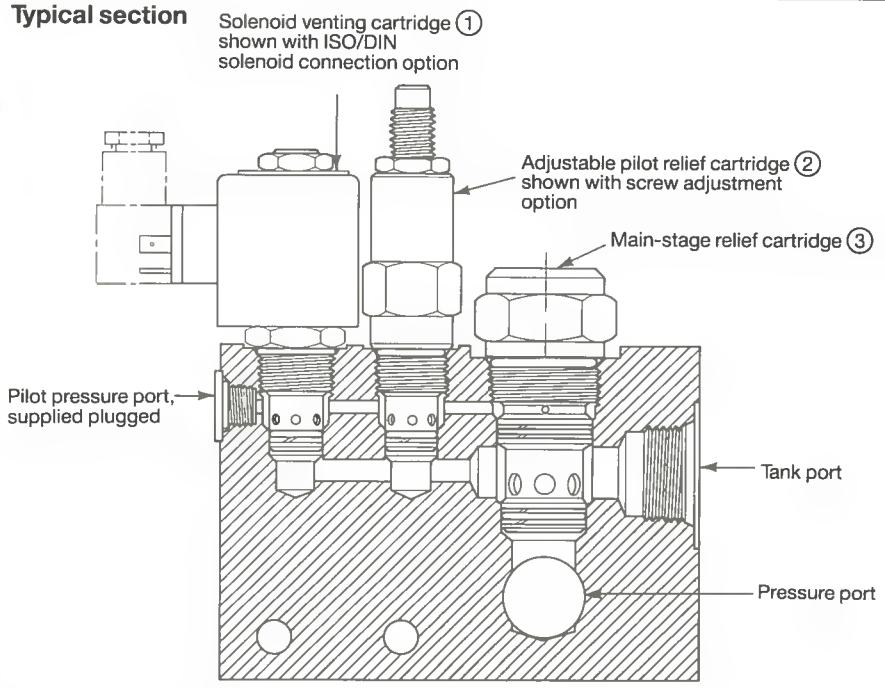
SRV1-16(V)-*-O



SRV1-16(V)-*-C



Typical section



For details of cartridges see "Spare parts", two pages on

Model and ordering code

SRV1-16(V)-*- *-*- **/**- **** ***

1 2 3 4 5 6 7 8

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Relief valve cracking pressure adjustment
C = Cap
F = Factory-set
I = Internal
K = Knob
S = Screw

3 Venting condition, solenoid de-energized
O = Normally open
C = Normally closed

4 Form
In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size main ports
16T = With SAE 16 size main ports

5 Relief valve cracking pressure adjustment range
3 = 3,45-20,6 bar (50-300 psi)
9 = 6,9-62 bar (100-900 psi)
18 = 17,3-124 bar (250-1800 psi)

6 Factory-set relief valve cracking pressure
Within ranges in 5 above
Blank = Normal factory setting, at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

7 Voltage rating

		Amps	Lead color
00D	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange

Continued on next page

115A =	115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A =	230VAC 60/50 Hz	0,08	Red/ White

8 Connector types
Blank = No coil

Continued in next column

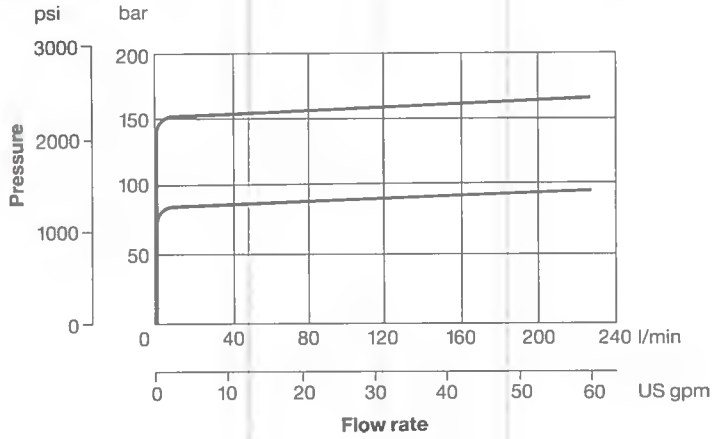
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" on next page.
P = ½" NPT conduit port
Q = Spade terminal (DC voltages only)
W = Leadwire (DC voltages and 24VAC only)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

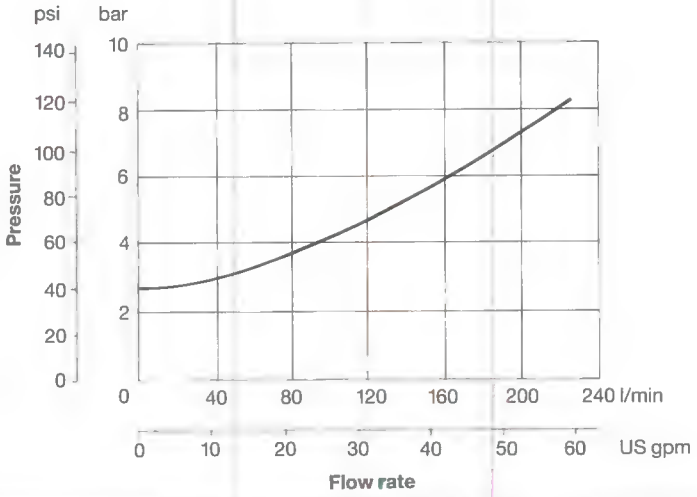
Max. pressure, all ports	207 bar (3000 psi) Light-duty housing, *not* fatigue-rated
Rated flow	227 l/min (60 US gpm)
Relief valve cracking pressure adjustment range	See 5 and 6 in "Model code" on previous page
Performance characteristics	See graphs below
Electrical characteristics and options	See 7 and 8 in "Model code"
Hydraulic fluids, temperature ranges and filtration recommendations	See 1 in "Model code" on previous page, and also page 266
Installation dimensions	See next page
Mass, including solenoid	3,17 kg (7.05 lb) approx.
Spare parts	See next page

Performance characteristics

Relief pressure override

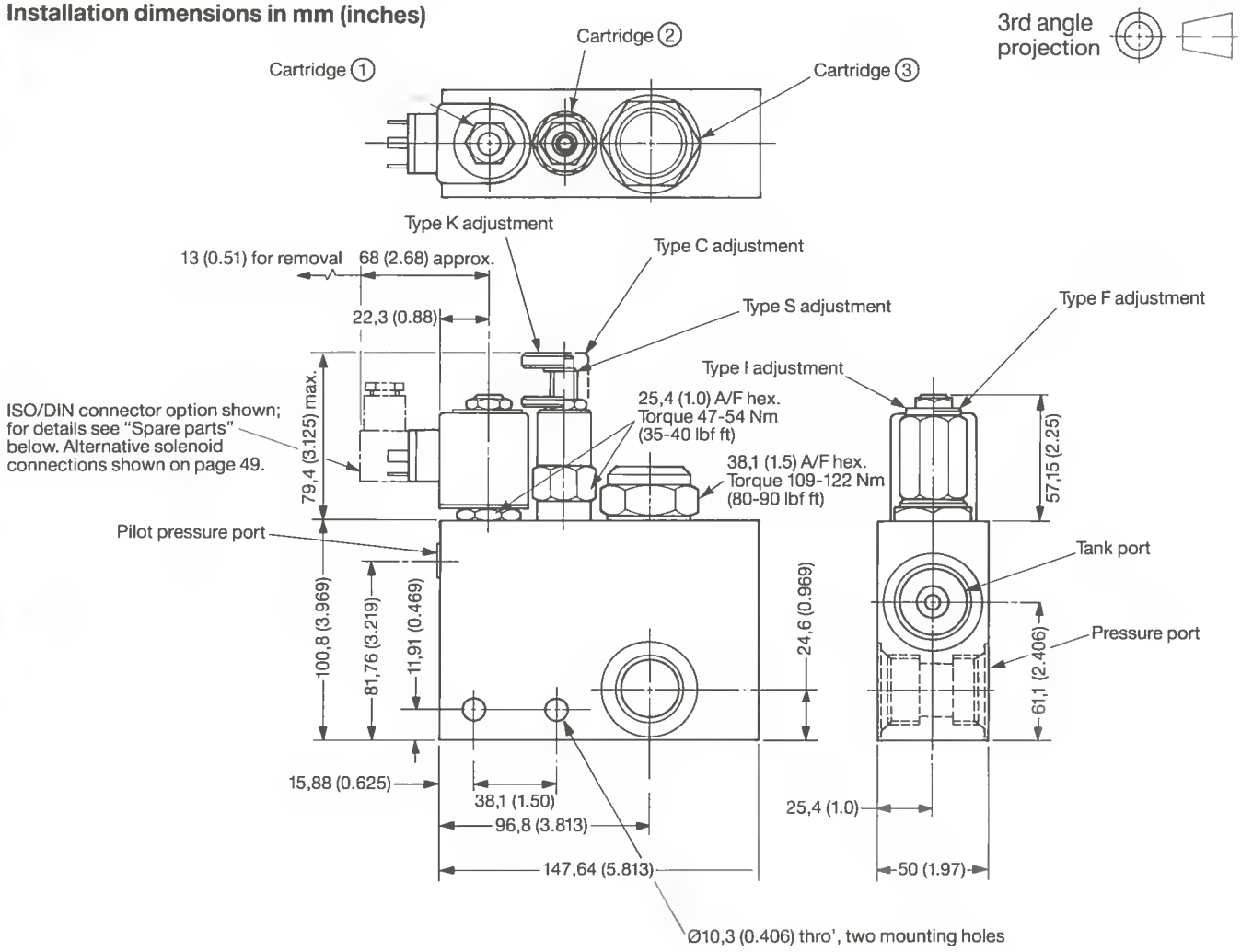


Pressure drop, vented



Installation dimensions in mm (inches)

3rd angle projection



Spare parts

The only parts available are:

a.	Seal kits comprising external seals and back-up rings, one relevant kit per cartridge:	Kit no.	See page
	DPS2-16-*	SK-16-3S	242
	DPS2-16V-*	SK-16V-3S	242
	RV3-10-*	SK-10-2	84
	RV3-10V-*	SK-10V-2	84
	SV4-10-*	SK-10-2	26 & 29
	SV4-10V-*	SK-10V-2	26 & 29
b.	Solenoid venting cartridge ① for:	Cartridge designation	
	SRV1-16-*-O-***-**/**-*****	SV4-10-O-0-*****	29
	SRV1-16V-*-O-***-**/**-*****	SV4-10V-O-0-*****	29
	SRV1-16-*-C-***-**/**-*****	SV4-10-C-0-*****	26
	SRV1-16V-*-C-***-**/**-*****	SV4-10V-C-0-*****	26
c.	Pilot relief cartridge ② for:	Cartridge designation	
	SRV1-16-*-*-***-**/**	RV3-10-*-0-**/**	84
	SRV1-16V-*-*-***-**/**	RV3-10V-*-0-**/**	84
d.	Main-stage relief cartridge ③ for:	Cartridge designation	
	SRV1-16-*	DPS2-16-V-F-0-40	242
	SRV1-16V-*	DPS2-16V-V-F-0-40	242
e.	Solenoid coil and ancillary parts	—	49
f.	ISO/DIN solenoid connector plug options:	Part no.	
	Black, marked B	710775	50
	Gray, marked A	710776	50

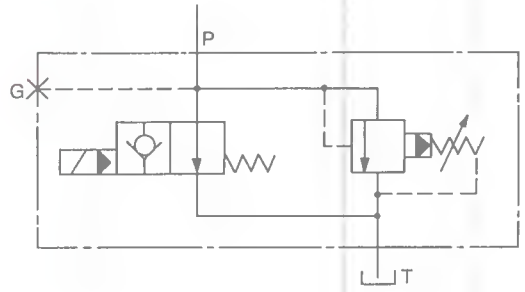
Note: When ordering cartridges their designations must include the same alphanumeric portions (represented above by bold-faced asterisks) as in the SRV1-16 designations.

Adjustable relief valves with solenoid operated bypass, normally-open and normally-closed series

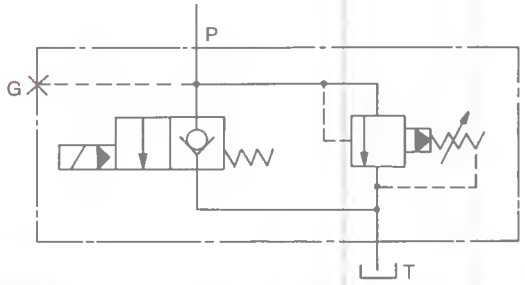
SRV2-10

Functional symbols

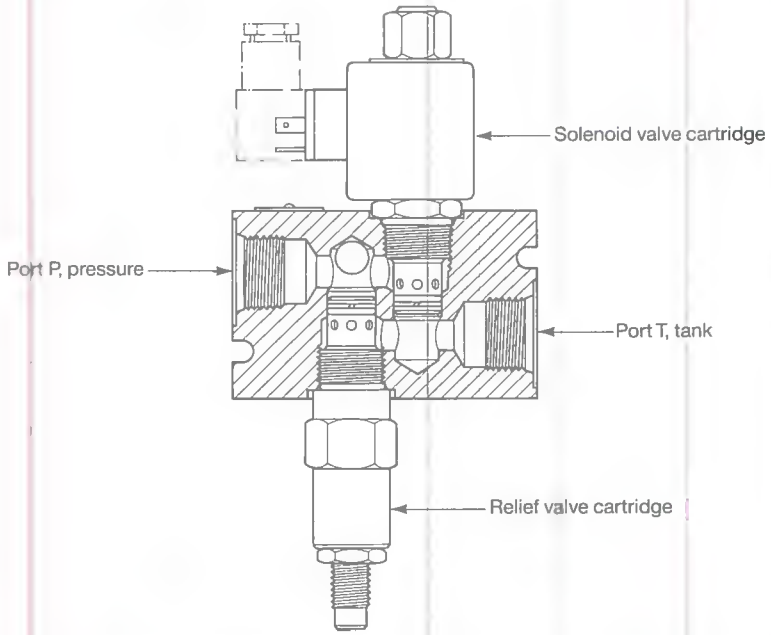
SRV2-10(V)-*-O



SRV2-10(V)-*-C



Typical section



Model and ordering code

SRV2-10(V)-* - * -8T-/** - **** ***

1 2 3 4 5 6 7

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Relief valve cracking pressure adjustment
C = Cap
F = Factory-set
I = Internal
K = Knob
S = Screw

3 Bypass condition, solenoid de-energized
O = Normally open
C = Normally closed

4 Relief valve cracking pressure adjustment range
3 = 3,45-20,6 bar (50-300 psi)
20 = 6,9-137 bar (100-2000 psi)
30 = 17,3-206 bar (250-3000 psi)

5 Factory-set relief valve cracking pressure
Within ranges in 4 above
Blank = Normal factory setting, at approx. mid-range

User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

6 Voltage rating		**Amps**	**Lead color**
00D	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue
24A	= 24VAC 60/50 Hz	0,75	Orange
115A	= 115VAC 60 Hz/ 110VAC 50 Hz	0,16	Yellow
230A	= 230VAC 60/50 Hz	0,08	Red/ White

Continued on next page

7 Connector types

Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts", on next page
P = ½" NPT conduit port
Q = Spade terminal (DC voltages only)
W = Leadwire (DC voltages and 24VAC only)

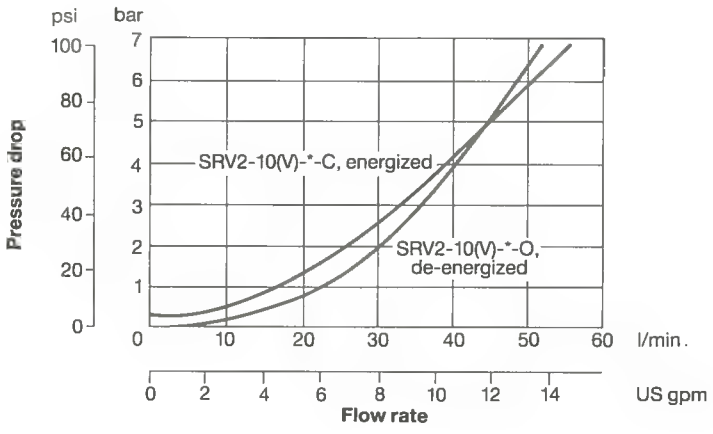
Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi) Light-duty housing, *not* fatigue-rated
Rated flow	114 l/min (30 US gpm)
Relief valve cracking pressure adjustment range	See 4 and 5 in "Model code" on previous page
Relief valve pressure override characteristics	See RV2-10 graph on page 85
Bypass pressure drop characteristics	See graph below
Electrical characteristics and options	See 6 and 7 in "Model code" on previous page and above
Hydraulic fluids, temperature ranges and filtration recommendations	See 1 in "Model code" on previous page, and also page 266
Installation dimensions	See next page
Mass, including solenoid	1,13 kg (2.48 lb) approx.
Spare parts	See next page

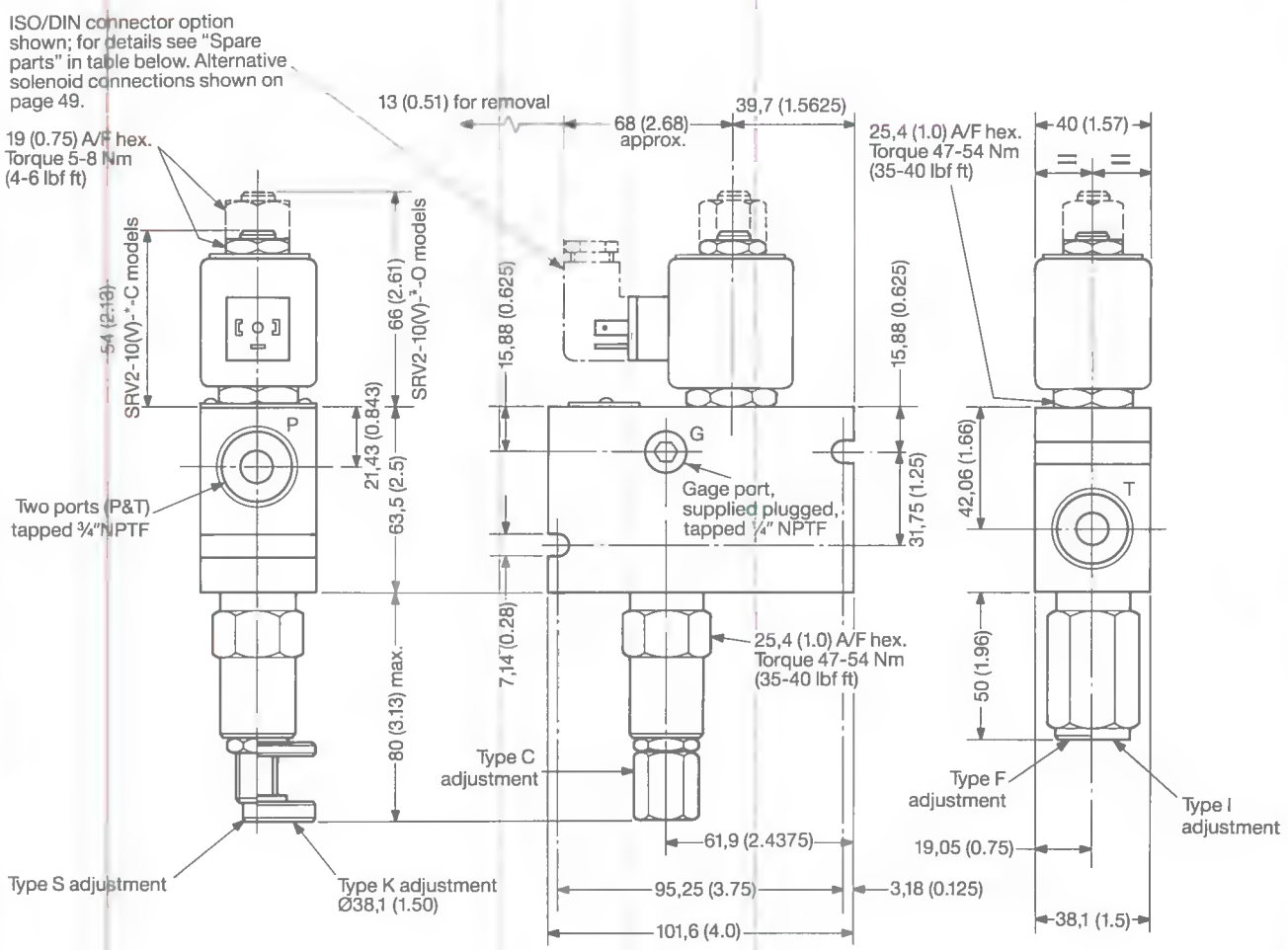
Bypass pressure drop characteristics

Conditions:
– Solenoid de-energized in SRV2-10(V)-*-O models
– Solenoid energized in SRV2-10(V)-*-C models



Installation dimensions in mm (inches)

3rd angle projection



Spare parts

		See page
The only parts available are:		
a. Seal kits comprising external seals and back-up rings. Two kits per SRV2 valve required, one for the solenoid valve cartridge and one for the relief valve cartridge:	Kit no.	
SRV2-10-*	SK-10-2, per one cartridge	—
SRV2-10V-*	SK-10V-2, per one cartridge	—
b. Solenoid coil and ancillary parts	—	49
c. ISO/DIN solenoid connector plug options:	Part no.	
Black, marked B	710775	50
Gray, marked A	710776	50
d. Solenoid valve cartridge for:	Cartridge designation	
SRV2-10-*-O-8T-**/**-*****	SV5-10-O-0-*****	29
SRV2-10V-*-O-8T-**/**-*****	SV5-10V-O-0-*****	29
SRV2-10-*-C-8T-**/**-*****	SV1-10-C-0-*****	26
SRV2-10V-*-C-8T-**/**-*****	SV1-10V-C-0-*****	26
e. Relief valve cartridge for:	Cartridge designation	
SRV2-10-*-*-8T-**/**	RV2-10-*-0-**/**	84
SRV2-10V-*-*-8T-**/**	RV2-10V-*-0-**/**	84

Note: To complete cartridge designations in d. and e., substitute the appropriate alphanumeric code (from "Model code", two pages back) for the bold-faced asterisks in the cartridge designations above.

Flow controls

Vickers Modular offers a complete range of flow controls with a variety of features, including:

- Restrictors (non-compensated)
- Pressure compensated valves
- With and without reverse free-flow check
- Pre-set and adjustable
- Priority types, with bypass
- Velocity fuses (pipe-break valves)
- Flow divider/combiners

Notable are the two styles of flow divider/combiner:

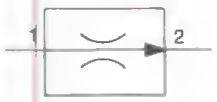
FDC1-**
Divides and combines flow of hydraulic fluid to a pre-selected ratio regardless of system load or pressure. Ideal for supplying two sub-circuits from a single pump, but not suitable for differential hydrostatic transmissions.

FDC3-**
Patented valves, configured for differential hydrostatic transmissions, allowing vehicles to corner and ensuring that if one wheel spins out then drive is still available to the other.

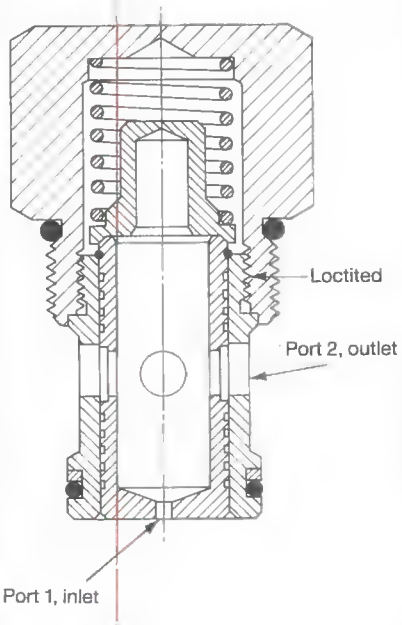
Pressure compensated flow controls, two-way, pre-set flow series

FR1-10/16/20

Functional symbol



Typical section



Model and ordering code

FR1-(V)-F-*** - ****
1 2 3 4

1 Nominal size/rated flow
10 = 23 l/min (6 US gpm)
16 = 114 l/min (30 US gpm)
20 = 227 l/min (60 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
FR1-10 models
6T = With SAE 6 size ports
FR1-16 models
12T = With SAE 12 size ports
FR1-20 models
16T = With SAE 16 size ports

Continued in next column

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
FR1-10 models
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports
FR1-16 models
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports
FR1-20 models
12H = With SAE 12 size ports
16H = With SAE 16 size ports
6G = With G¾" (BSPF) size ports
8G = With G1" (BSPF) size ports

4 Factory-set flow rate, nominal
Specify required flow code (US gpm value) (1 US gpm = 3,7853 l/min)
e.g.
0.5 = 1,89 l/min (0.5 US gpm)
20 = 75,7 l/min (20 US gpm)

Required flow rates must be within:
0,38-22,7 l/min (0.1-6 US gpm), for FR1-10 valves
1,9-113 l/min (0.5-30 US gpm), for FR1-16 valves
3,8-227 l/min (1.0-60 US gpm), for FR1-20 valves

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

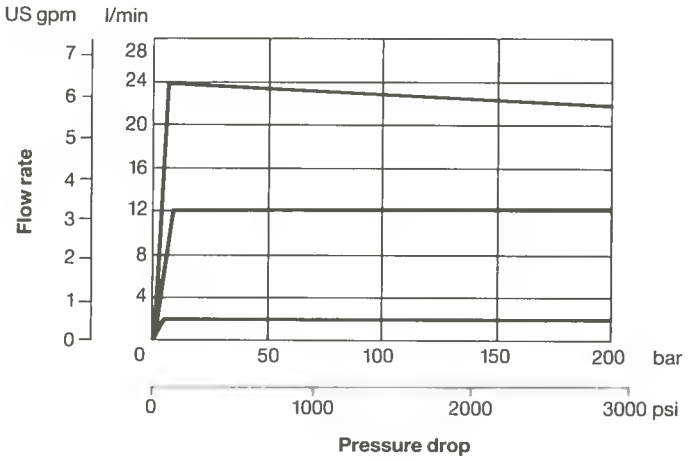
Max. pressure, both ports	207 bar (3000 psi)
Rated flow	See 1 in "Model code" above
Factory-set flow rate and max. range	See 4 in "Model code" above
Factory-set flow rate accuracy under standard test conditions and within the following ranges:	
FR1-10 valves	Tolerance
0,38-1,9 l/min (0.1-0.49 US gpm)	±20%
1,9-5,6 l/min (0.5-1.49 US gpm)	±15%
5,7-22,7 l/min (1.5-6.0 US gpm)	±10%
FR1-16 valves	
1,9-10,9 l/min (0.5-2.9 US gpm)	±15%
11,4-113 l/min (3-30 US gpm)	±10%
FR1-20 valves	
3,8-18,5 l/min (1-4.9 US gpm)	±15%
19-227 l/min (5-60 US gpm)	±10%

Continued on next page

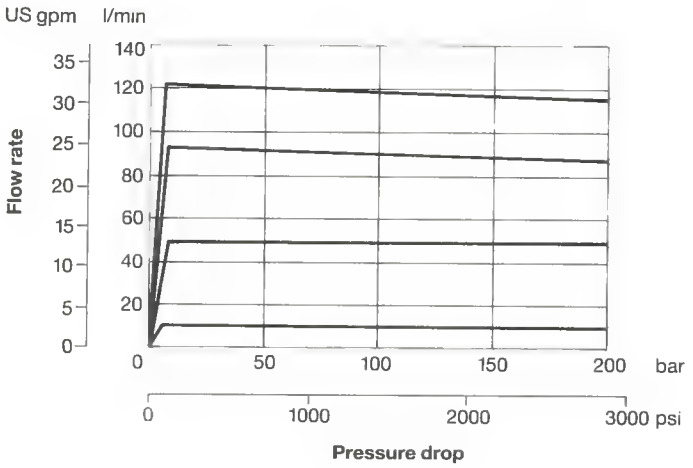
Performance characteristics	See graphs below and on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size: FR1-10 FR1-16 FR1-20	 C-10-2 C-16-2 C-20-2 For dimensions see page 247
Mass, cartridge only: FR1-10 FR1-16 FR1-20	 0,11 kg (0.25 lb) approx. 0,33 kg (0.72 lb) approx. 0,82 kg (1.80 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

Performance characteristics
Cartridges only, at various settings

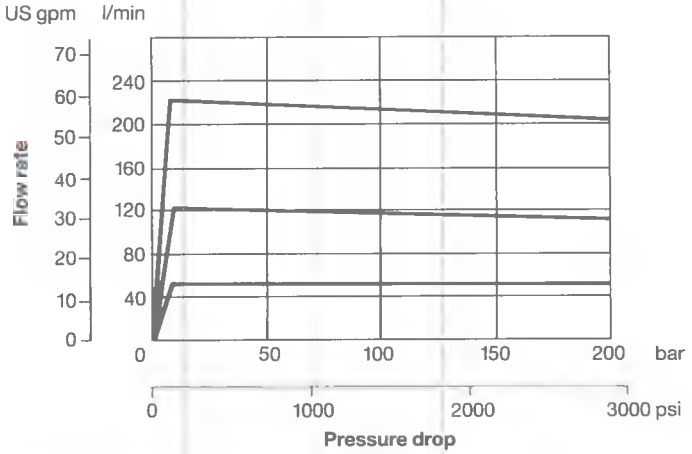
FR1-10



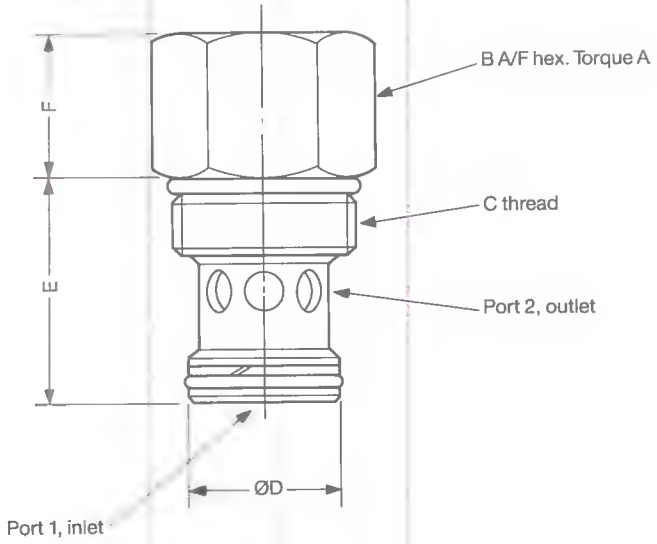
FR1-16



FR1-20



Installation dimensions in mm (inches)



Model	A	B	C	ØD	E	F
FR1-10	47-54 Nm (35-40 lbf ft)	25,4 (1.0)	0.875″-14 UNF	15,82 (0.623) 15,77 (0.621)	31,75 (1.250)	19,1 (0.75)
FR1-16	109-122 Nm (80-90 lbf ft)	38,1 (1.5)	1.3125″-12 UN	28,55 (1.124) 28,50 (1.122)	44,45 (1.750)	28,6 (1.125)
FR1-20	129-156 Nm (95-115 lbf ft)	47,2 (1.875)	1.625″-12 UN	36,47 (1.436) 36,40 (1.433)	57,15 (2.250)	38,1 (1.50)

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

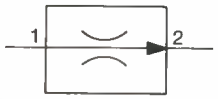
	Kit no.
FR1-10-F	SK-10-2
FR1-10V-F	SK-10V-2
FR1-16-F	SK-16-2
FR1-16V-F	SK-16V-2
FR1-20-F	SK-20-2
FR1-20V-F	SK-20V-2

Pressure compensated flow controls, two-way, adjustable and factory-set series

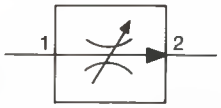
FR2-10/16

Functional symbols

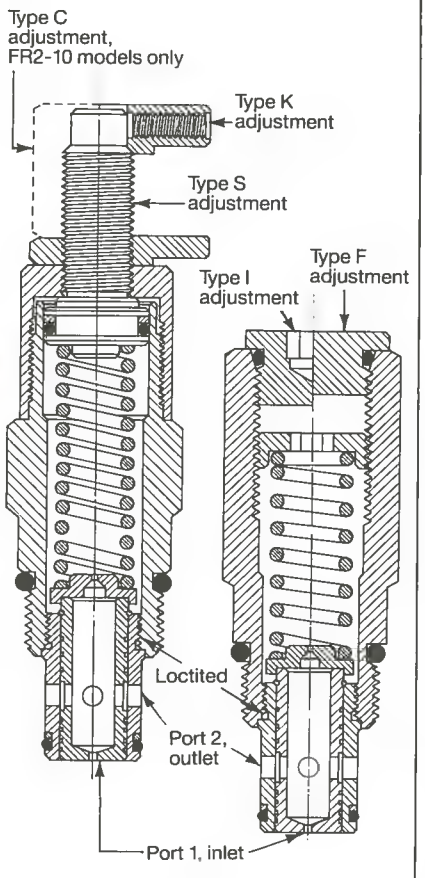
FR2-10(V)-F models



All other models



Typical sections



FR2-10 models
Similar construction for FR2-16 models

FR2-10 models only

Model and ordering code

FR2-(V)- * -***-****

1 2 3 4 5

1 Nominal size/rated flow
10 = 38 l/min (10 US gpm)
16 = 114 l/min (30 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Flow adjustment
C = Cap
F = Factory-set
I = Internal
K = Knob
S = Screw
} Option for FR2-10 valve only

4 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
FR2-10 models
6T = With SAE 6 size ports
FR2-16 models
12T = With SAE 12 size ports

Continued in next column

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
FR2-10 models
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports
FR2-16 models
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

5 Factory-set maximum flow rate, nominal
Specify required maximum ▲ flow code (US gpm value) (1 US gpm = 3,7853 l/min) e.g.
0.5 = 1,89 l/min (0.5 US gpm)
20 = 75,7 l/min (20 US gpm)

Required maximum flow rates must be within:
0,38-37,8 l/min (0.1-10 US gpm), for FR2-10 valves
1,9-113 l/min (0.5-30 US gpm), for FR2-16 valves
▲ FR2-10(V)-F models should not be adjusted subsequently.

Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

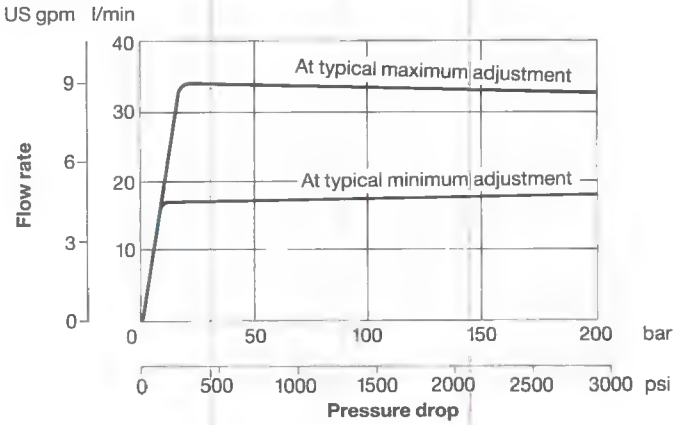
Max. pressure, both ports	207 bar (3000 psi)
Rated flow	See 1 in "Model code" above
Factory-set maximum flow rate	See 5 in "Model code" above
Factory-set maximum flow rate accuracy under standard test conditions and within the following ranges:	
FR2-10 valves	Tolerance
0,4-1,9 l/min (0.1-0.49 US gpm)	±20%
1,9-7,5 l/min (0.5-1.99 US gpm)	±15%
7,6-37,8 l/min (2.0-10.0 US gpm)	±10%
FR2-16 valves	
1,9-10,9 l/min (0.5-2.9 US gpm)	±15%
11,4-113 l/min (3-30 US gpm)	±10%
Flow adjustment range, from factory-set maximum flow rate	Down to 50% of factory-set maximum flow rate

Continued on next page

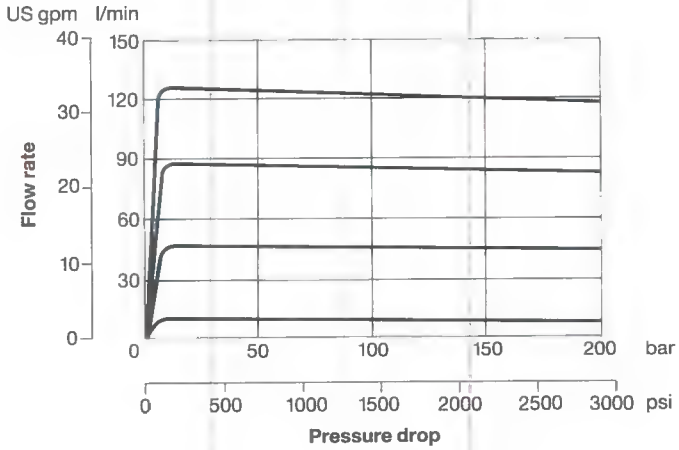
Performance characteristics	See graphs below
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size: FR2-10 FR2-16	 C-10-2 C-16-2 For dimensions see page 247
Mass, cartridge only: FR2-10 FR2-16	 0,22 kg (0.48 lb) approx. 0,71 kg (1.57 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

Performance characteristics
Cartridges only

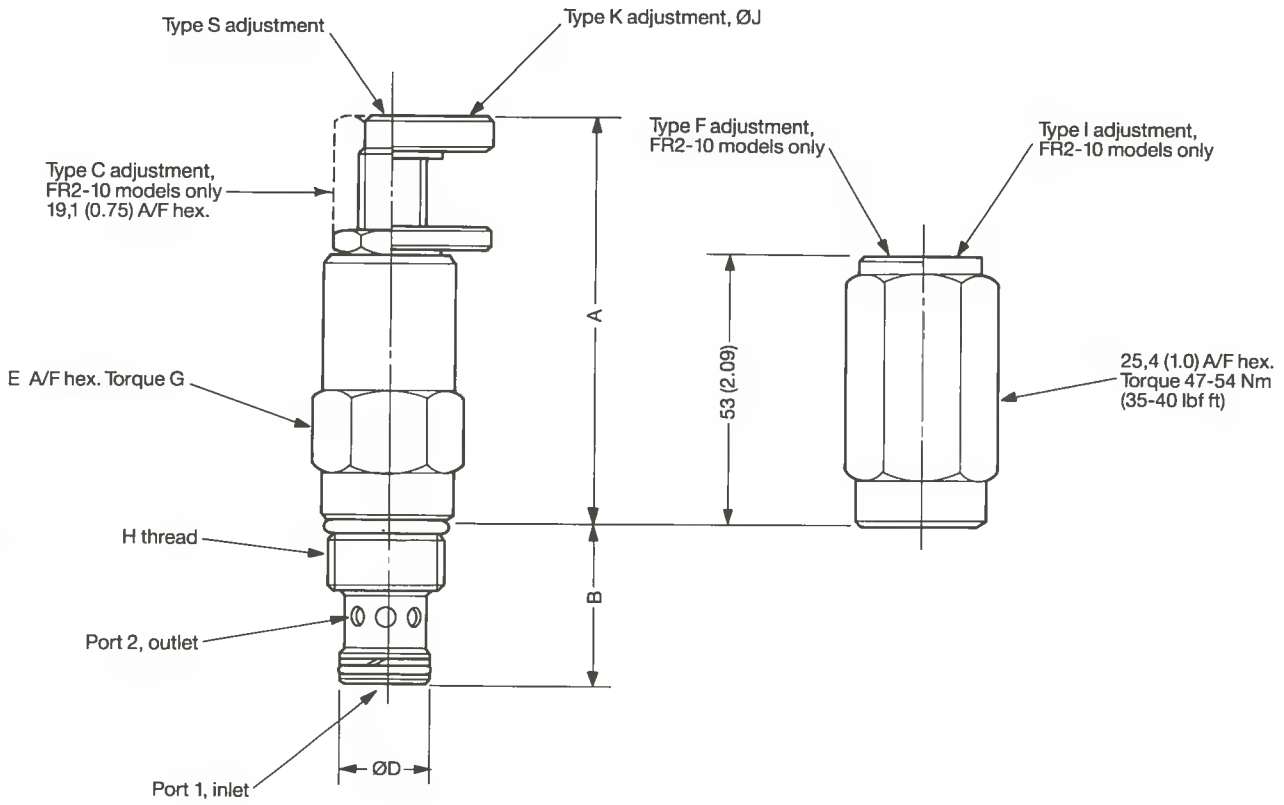
FR2-10



FR2-16
At various settings



Installation dimensions in mm (inches)



Model	A	B	ØD	E	G	H	ØJ
FR2-10	80 (3.15)	31,75 (1.250)	15,82 (0.623) 15,80 (0.622)	25,4 (1.0)	47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	38,1 (1.5)
FR2-16	104 (4.09)	44,50 (1.750)	28,55 (1.124) 28,47 (1.121)	38,1 (1.5)	109-122 Nm (80-90 lbf ft)	1.3125″-12 UN	50,8 (2.0)

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

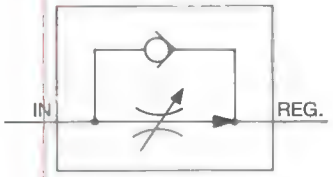
	Kit no.
FR2-10-*	SK-10-2
FR2-10V-*	SK-10V-2
FR2-16-*	SK-16-2
FR2-16V-*	SK-16V-2

Pressure compensated flow controls, two-way, adjustable series, with or without reverse free-flow check

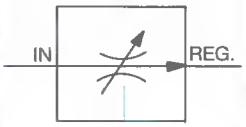
FR4-10/16

Functional symbols

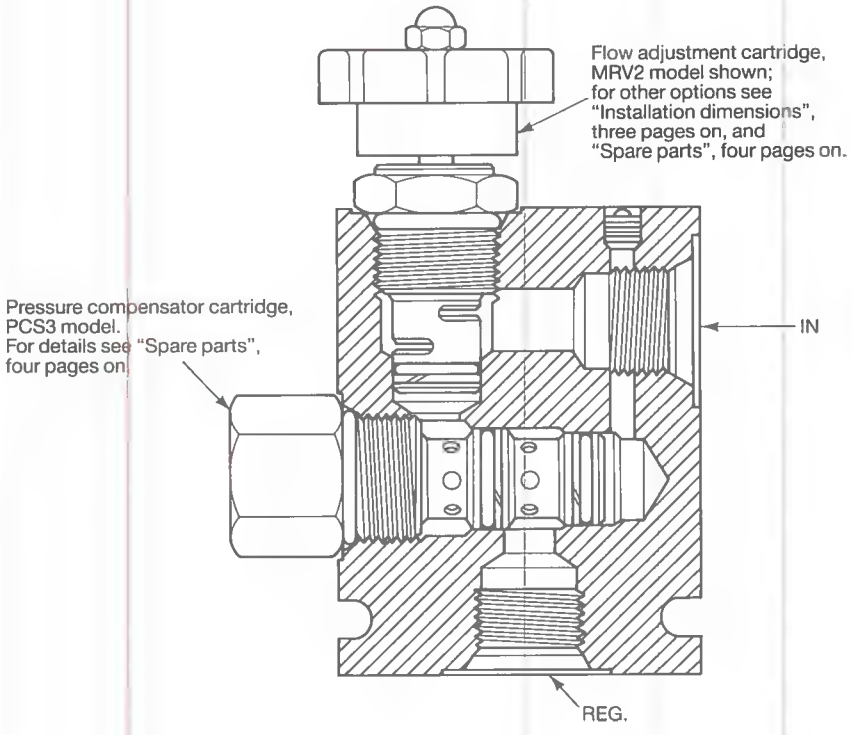
FR4-10(V)-**T-H**/S** models



All other models



Typical section



Model and ordering code

FR4- (V)- ** - ***

1 2 3 4

1 Nominal size/rated flow (max. adjustable)
10 = 38 l/min (10 US gpm)
16 = 114 l/min (30 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
In light-duty housing;
207 bar (3000 psi) max.
FR4-10 models
6T = With SAE 6 size ports
8T = With SAE 8 size ports
FR4-16 models
12T = With SAE 12 size ports
16T = With SAE 16 size ports

4 See next page

4 Adjustment type, flow range and reverse flow

Code	Adjustment type	Flow adjustment range l/min (US gpm)	Reverse free-flow
For FR4-10 models			
D1	Handlever with 10-position detent 180° turn	0,38-18,9 (0.1-5.0)	No
D2		0,38-34 (0.1-9.0)	No
H1	Knob with 3 × 360° turns	0,38-18,9 (0.1-5.0)	Yes
H2		0,38-34 (0.1-9.0)	No
H3		0,38-5,67 (0.1-1.5)	Yes
H31		0,38-1,13 (0.1-0.3)	Yes
H32		0,38-2,27 (0.1-0.6)	Yes
K1	Calibrated knob, 180° turn	0,38-18,9 (0.1-5.0)	No
K2		0,38-34 (0.1-9.0)	No
L1	Handlever with friction lock and 180° turn	0,38-18,9 (0.1-5.0)	No
L2		0,38-34 (0.1-9.0)	No
S1	Screwdriver adjustment with 3 × 360° turns	0,38-18,9 (0.1-5.0)	Yes
S2		0,38-34 (0.1-9.0)	No
S3		0,38-5,67 (0.1-1.5)	Yes
S31		0,38-1,13 (0.1-0.3)	Yes
S32		0,38-2,27 (0.1-0.6)	Yes
For FR4-16 models			
D1	Handlever with 10-position detent 180° turn	0,38-37,8 (0.1-10)	No
D2		0,38-113 (0.1-30)	No
D3		0,38-75,7 (0.1-20)	No
K1	Calibrated knob with 180° turn	0,38-37,8 (0.1-10)	No
K2		0,38-113 (0.1-30)	No
K3		0,38-75,7 (0.1-20)	No
L1	Handlever with friction lock and 180° turn	0,38-37,8 (0.1-10)	No
L2		0,38-113 (0.1-30)	No
L3		0,38-75,7 (0.1-20)	No

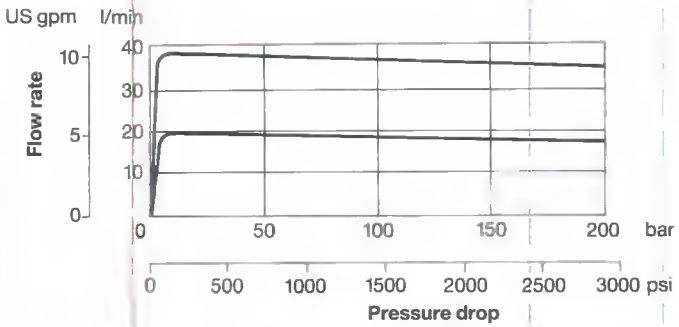
Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

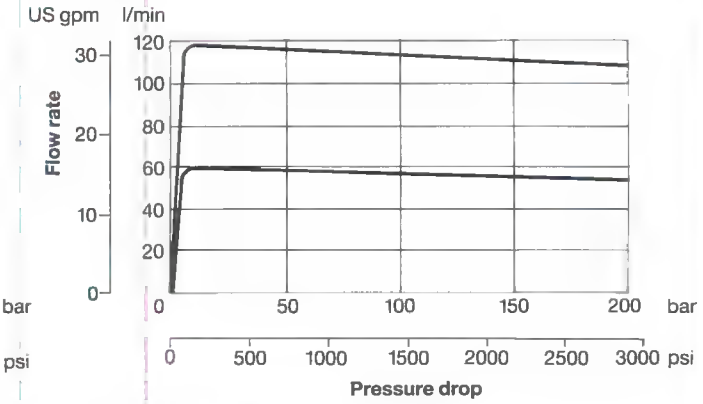
Max. pressure, both ports	207 bar (3000 psi) in light-duty housing
Pressure drop limits, inlet minus outlet, for effective pressure compensation:	
Minimum	6,9 bar (100 psi)
Maximum	207 bar (3000 psi)
Rated flow	See 1 in "Model code" on previous page
Flow adjustment options	See 4 in "Model code" above
Performance characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" on previous page, and also page 266
Installation dimensions	See next page
Mass:	
FR4-10	0,51 kg (1.12 lb) approx.
FR4-16	1,75 kg (3.85 lb) approx.
Spare parts	See three pages on

Performance characteristics
At various settings

FR4-10



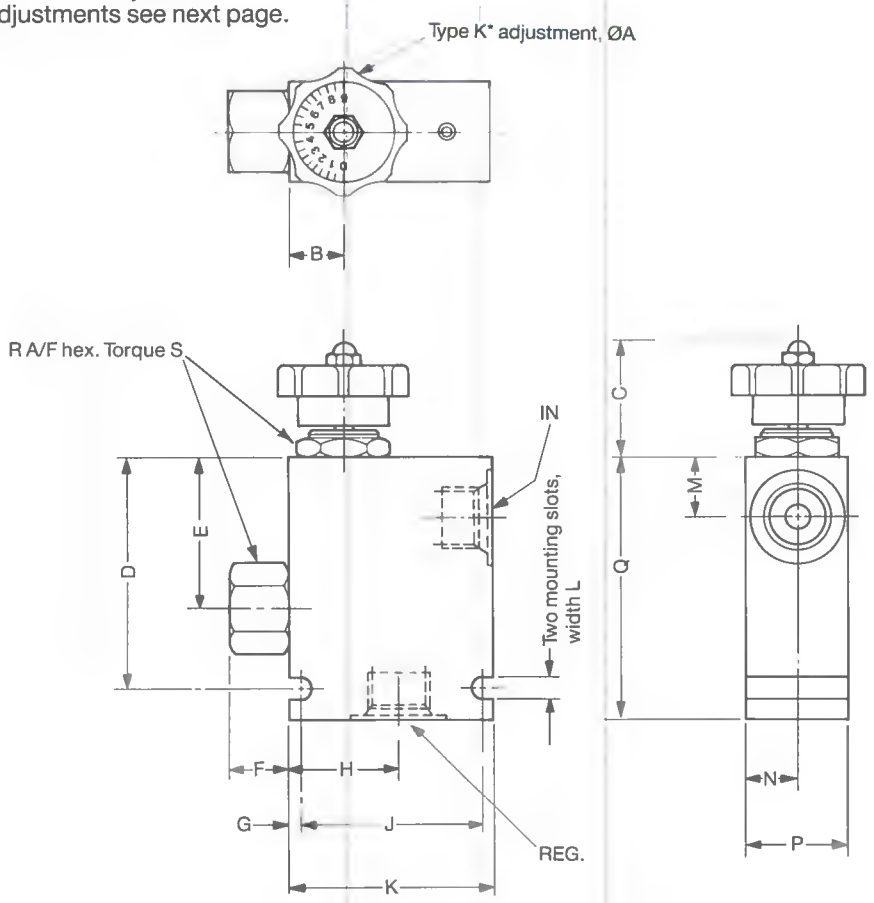
FR4-16



Installation dimensions in mm (inches)

3rd angle projection

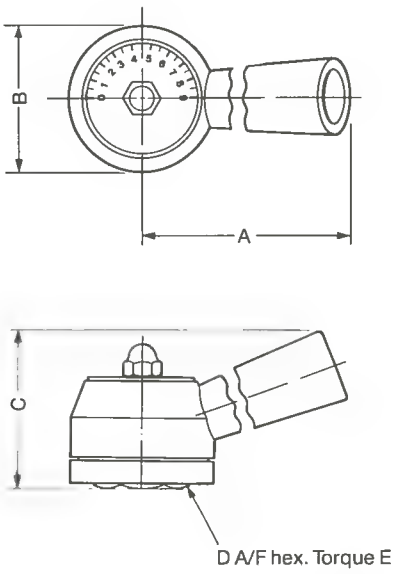
Models with type K* flow adjustment
For other flow adjustments see next page.



Model	ØA	B	C	D	E	F	G	H	J	K
FR4-10	42 (1.65)	17,48 (0.688)	36,53 (1.438)	72,90 (2.87)	47,63 (1.875)	19,05 (0.75)	3,0 (0.12)	34,14 (1.344)	57,15 (2.25)	63,50 (2.50)
FR4-16	61 (2.40)	23,83 (0.938)	46,05 (1.813)	111,3 (4.38)	76,20 (3.00)	28,58 (1.125)	3,81 (0.15)	53,98 (2.125)	93,68 (3.688)	101,60 (4.00)

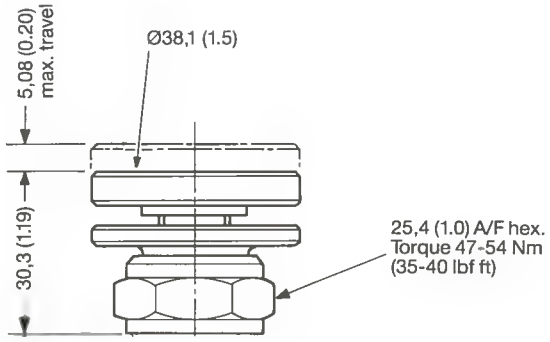
Model	L	M	N	P	Q	R	S
FR4-10	7,11 (0.28)	19,05 (0.75)	15,88 (0.625)	31,75 (1.25)	82,55 (3.25)	25,40 (1.00)	47-54 Nm (35-40 lbf ft)
FR4-16	8,63 (0.34)	25,40 (1.00)	23,83 (0.938)	47,75 (1.88)	127,0 (5.00)	38,10 (1.50)	109-122 Nm (80-90 lbf ft)

Types L* and D* flow adjustments

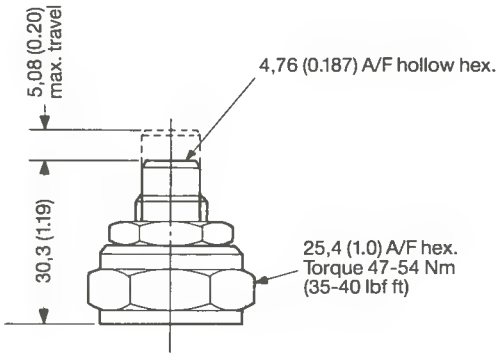


Model	A	B	C	D	E
FR4-10	83 (3.25)	40,2 (1.58)	57,2 (2.25)	25,40 (1.00)	47-54 Nm (35-40 lbf ft)
FR4-16	105 (4.125)	57,2 (2.25)	76,2 (3.00)	38,10 (1.50)	109-122 Nm (80-90 lbf ft)

Type H* flow adjustment
Option for FR4-10 models only



Type S flow adjustment
Option for FR4-10 models only



Spare parts

The only parts available are complete cartridges and seal kits, the latter comprising external seals and back-up rings

a. Flow adjustment cartridges and related seal kits; for use with antiwear hydraulic oil only

For FR4 valve	Cartridge	See page	Seal kit
FR4-10-**T-D1	MRV2-10-D-0-05	149	SK-10-2
FR4-10-**T-D2	MRV2-10-D-0-10	149	SK-10-2
FR4-10-**T-H1	FCV6-10-K-0-FF	152	SK-10-2
FR4-10-**T-H2	FCV6-10-K-0-NV	152	SK2-10-2
FR4-10-**T-H3	FCV6-10-K-0-40	152	SK-10-2
FR4-10-**T-H31	FCV6-10-K-0-10	152	SK-10-2
FR4-10-**T-H32	FCV6-10-K-0-20	152	SK-10-2
FR4-10-**T-K1	MRV2-10-K-0-05	146	SK-10-2
FR4-10-**T-K2	MRV2-10-K-0-10	146	SK-10-2
FR4-10-**T-L1	MRV2-10-L-0-05	146	SK-10-2
FR4-10-**T-L2	MRV2-10-L-0-10	146	SK-10-2
FR4-10-**T-S1	FCV6-10-S-0-FF	152	SK-10-2
FR4-10-**T-S2	FCV6-10-S-0-NV	152	SK2-10-2
FR4-10-**T-S3	FCV6-10-S-0-40	152	SK-10-2
FR4-10-**T-S31	FCV6-10-S-0-10	152	SK-10-2
FR4-10-**T-S32	FCV6-10-S-0-20	152	SK-10-2
FR4-16-**T-D1	MRV2-16-D-0-10	149	SK-16-2
FR4-16-**T-D2	MRV2-16-D-0-30	149	SK-16-2
FR4-16-**T-D3	MRV2-16-D-0-20	149	SK-16-2
FR4-16-**T-K1	MRV2-16-K-0-10	146	SK-16-2
FR4-16-**T-K2	MRV2-16-K-0-30	146	SK-16-2
FR4-16-**T-K3	MRV2-16-K-0-20	146	SK-16-2
FR4-16-**T-L1	MRV2-16-L-0-10	149	SK-16-2
FR4-16-**T-L2	MRV2-16-L-0-30	149	SK-16-2
FR4-16-**T-L3	MRV2-16-L-0-20	149	SK-16-2

b. Flow adjustment cartridges and related seal kits for use with antiwear hydraulic oil or phosphate-ester

Model designations of valves, cartridges and seal kits are as listed above but with "V"-codes added as in the following example:

For FR4 valve	Cartridge	Seal kit
FR4-10**V**-**T-D1	MRV2-10**V**-D-0-05	SK-10**V**-2

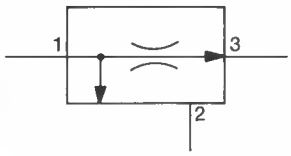
c. Pressure compensator cartridges and related seal kits

For FR4 valve	Cartridge	See page	Seal kit
FR4-10-**T	PCS3-10-0-160	233	SK-10-3
FR4-10V-**T	PCS3-10V-0-160	233	SK-10V-3
FR4-16-**T	PCS3-16-0-160	233	SK-16-3
FR4-16V-**T	PCS3-16V-0-160	233	SK-16V-3

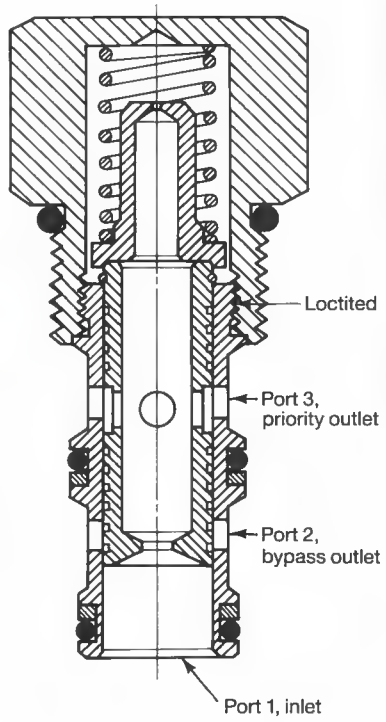
Pressure compensated priority flow controls, three-way, pre-set series

PFR1-10/16

Functional symbol



Typical section



PFR1-10
Similar construction for PFR1-16

Model and ordering code

PFR1-(V)-F-***-****
1 2 3 4

1 Nominal size/rated flow
10 = 23 l/min (6 US gpm)
16 = 114 l/min (30 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
PFR1-10 models
6T = With SAE 6 size ports
PFR1-16 models
12T = With SAE 12 size ports

Continued in next column

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
PFR1-10 models
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports
PFR1-16 models
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

4 Factory-set priority flow rate, nominal
Specify required priority-flow code (US gpm value) (1 US gpm = 3,7853 l/min) e.g.
0.5 = 1,89 l/min (0.5 US gpm)
20 = 75,7 l/min (20 US gpm)

Required priority flow rates must be within:
0,38-22,7 l/min (0.1-6 US gpm), for PFR1-10 valves
1,9-113 l/min (0.5-30 US gpm), for PFR1-16 valves

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

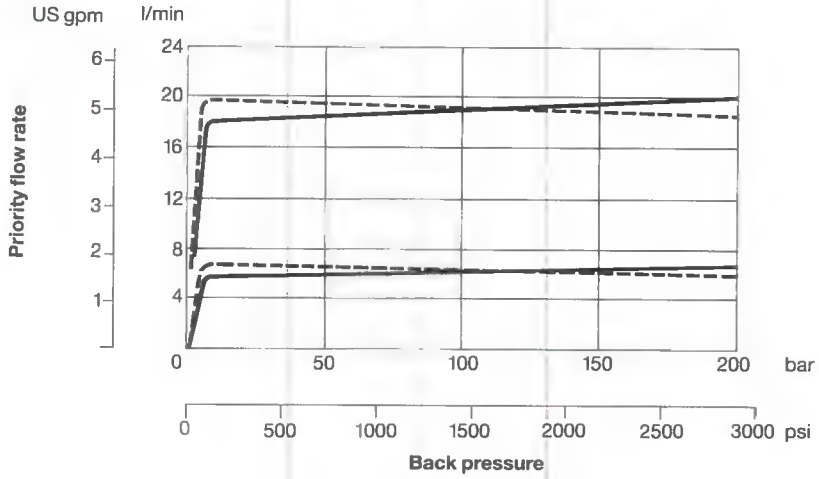
Max. pressure, both ports	207 bar (3000 psi)
Pressure drop limits, inlet minus outlets, for effective pressure compensation:	
Minimum	6,9 bar (100 psi)
Maximum	207 bar (3000 psi)
Rated flow	See 1 in "Model code" above
Max. inlet flow:	
PFR1-10	57 l/min (15 US gpm)
PFR1-16	151 l/min (40 US gpm)
Factory-set priority flow rate options	See 4 in "Model code" above
Factory-set priority flow rate accuracy under standard test conditions and within the following ranges:	
PFR1-10 valves	Tolerance
0,4-1,9 l/min (0.1-0.49 US gpm)	±20%
1,9-5,6 l/min (0.5-1.49 US gpm)	±15%
5,7-22,7 l/min (1.5-6.0 US gpm)	±10%
PFR1-16 valves	
1,9-10,9 l/min (0.5-2.9 US gpm)	±15%
11,4-113 l/min (3-30 US gpm)	±10%

Continued on next page

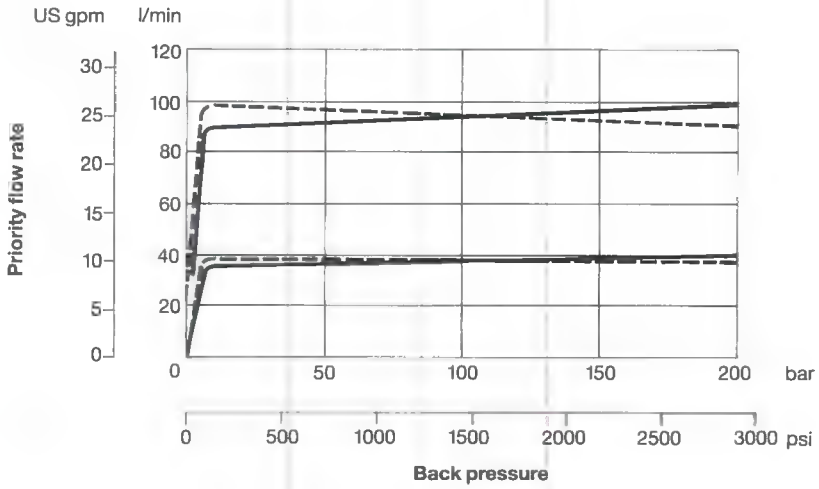
Performance characteristics	See graphs below
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size: PFR1-10 PFR1-16	 C-10-3 C-16-3 For dimensions see page 247
Mass, cartridge only: PFR1-10 PFR1-16	 0,12 kg (0.26 lb) approx. 0,38 kg (0.84 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 257 See page 253 Consult your local sales engineer
Spare parts	See next page

Performance characteristics
Cartridges only, at various settings
—— Port 3, priority (regulated) outlet pressurized
– – – Port 2, bypass outlet pressurized

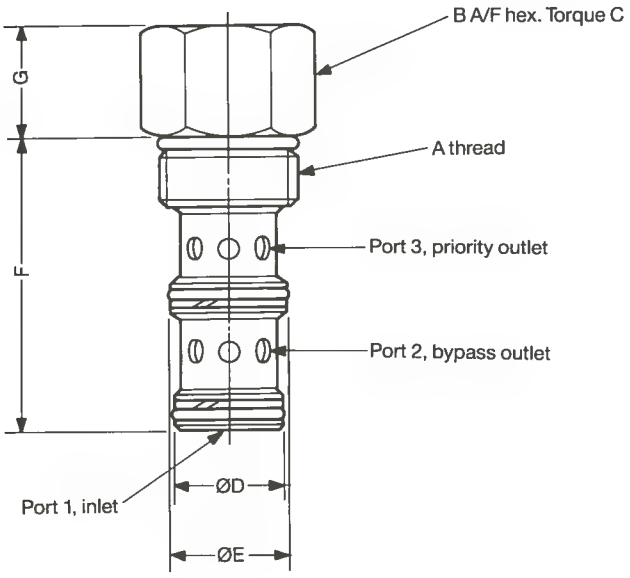
PFR1-10



PFR1-16



Installation dimensions in mm (inches)



Model	A	B	C	ØD	ØE	F	G
PFR1-10	0.875″-14 UNF	25,4 (1.0)	47-54 Nm (35-40 lbf ft)	15,82 (0.623) 15,77 (0.621)	17,42 (0.686) 17,37 (0.684)	46,02 (1.812)	19,05 (0.75)
PFR1-16	1.3125″-12 UN	38,1 (1.5)	109-122 Nm (80-90 lbf ft)	26,95 (1.061) 26,90 (1.059)	28,55 (1.124) 28,50 (1.122)	73,03 (2.875)	25,4 (1.0)

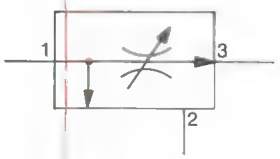
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PFR1-10-F	SK-10-3
PFR1-10V-F	SK-10V-3
PFR1-16-F	SK-16-3
PFR1-16V-F	SK-16V-3

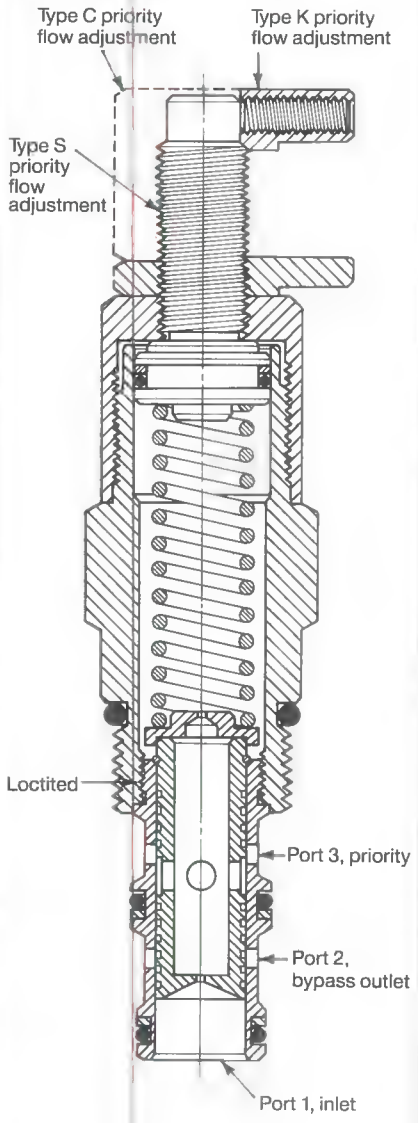
Pressure compensated priority flow controls, three-way, adjustable series

PFR2-10/16

Functional symbol



Typical section



PFR2-10
Similar construction for PFR2-16

Model and ordering code

PFR2-(V)-* - *** - ****
1 2 3 4 5

1 Nominal size/rated flow
10 = 38 l/min (10 US gpm)
16 = 114 l/min (30 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Priority flow adjustment
C = Cap. Option for PFR2-10 only
K = Knob
S = Screw

4 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
PFR2-10 models
6T = With SAE 6 size ports
PFR2-16 models
12T = With SAE 12 size ports

Continued in next column

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
PFR2-10 models
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports
PFR2-16 models
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

5 Factory-set maximum priority flow rate, nominal
Specify required priority-flow code (US gpm value) (1 US gpm = 3,7853 l/min) e.g.
0.5 = 1,89 l/min (0.5 US gpm)
20 = 75,7 l/min (20 US gpm)

Required max. priority flow rate must be within:
0,38-37,8 l/min (0.1-10 US gpm), for PFR2-10 valves
1,9-113 l/min (0.5-30 US gpm), for PFR2-16 valves

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

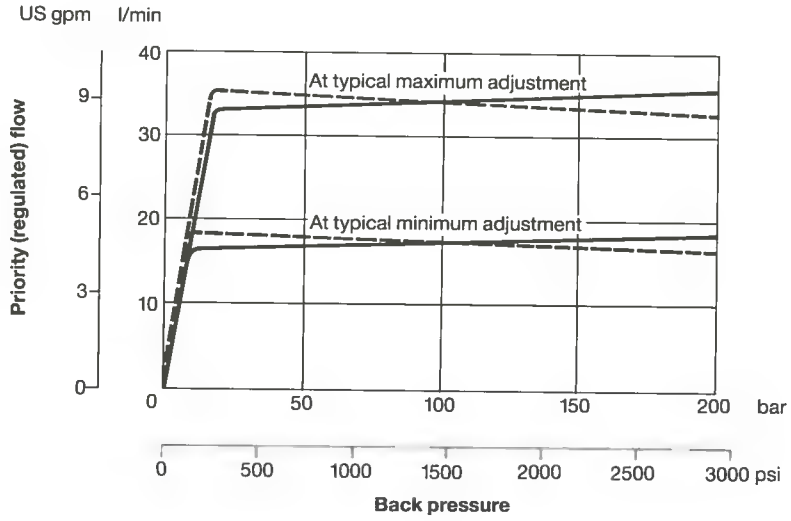
Max. pressure, both ports	207 bar (3000 psi)
Pressure drop limits, inlet minus outlets, for effective pressure compensation:	
PFR2-10	14 bar (200 psi) min. 207 bar (3000 psi) max.
PFR2-16	6,9 bar (100 psi min. 207 bar (3000 psi) max.
Rated flow	See 1 in "Model code" above
Max. inlet flow:	
PFR2-10	57 l/min (15 US gpm)
PFR2-16	151 l/min (40 US gpm)
Factory-set max. priority flow rate	See 5 in "Model code" above
Factory-set max. priority flow rate accuracy under standard test conditions and within the following ranges:	
PFR2-10 valves	Tolerance
0,4-1,9 l/min (0.1-0.49 US gpm)	±20%
1,9-7,5 l/min (0.5-1.99 US gpm)	±15%
7,6-37,8 l/min (2.0-10.0 US gpm)	±10%

Continued on next page

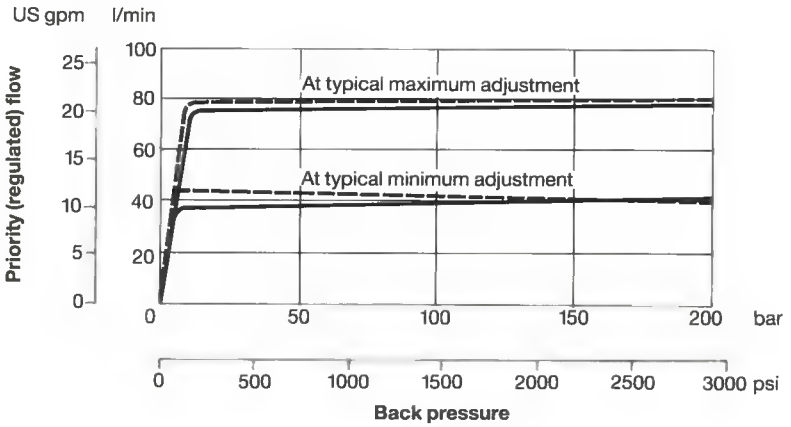
PFR2-16 valves 1,9-10,9 l/min (0.5-2.9 US gpm) 11,4-113 l/min (3-30 US gpm)	 ±15% ±10%
Flow adjustment range, from factory-set max. priority flow	Down to 50% of factory-set maximum
Performance characteristics	See graphs below
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size: PFR2-10 PFR2-16	 C-10-3 C-16-3 For dimensions see page 247
Mass, cartridge only: PFR2-10 PFR2-16	 0,25 kg (0.54 lb) approx. 0,43 kg (0.95 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 257 See page 253 Consult your local sales engineer
Spare parts	See next page

Performance characteristics
Cartridges only
—— Port 3, priority (regulated) outlet pressurized
– – – Port 2, bypass outlet pressurized

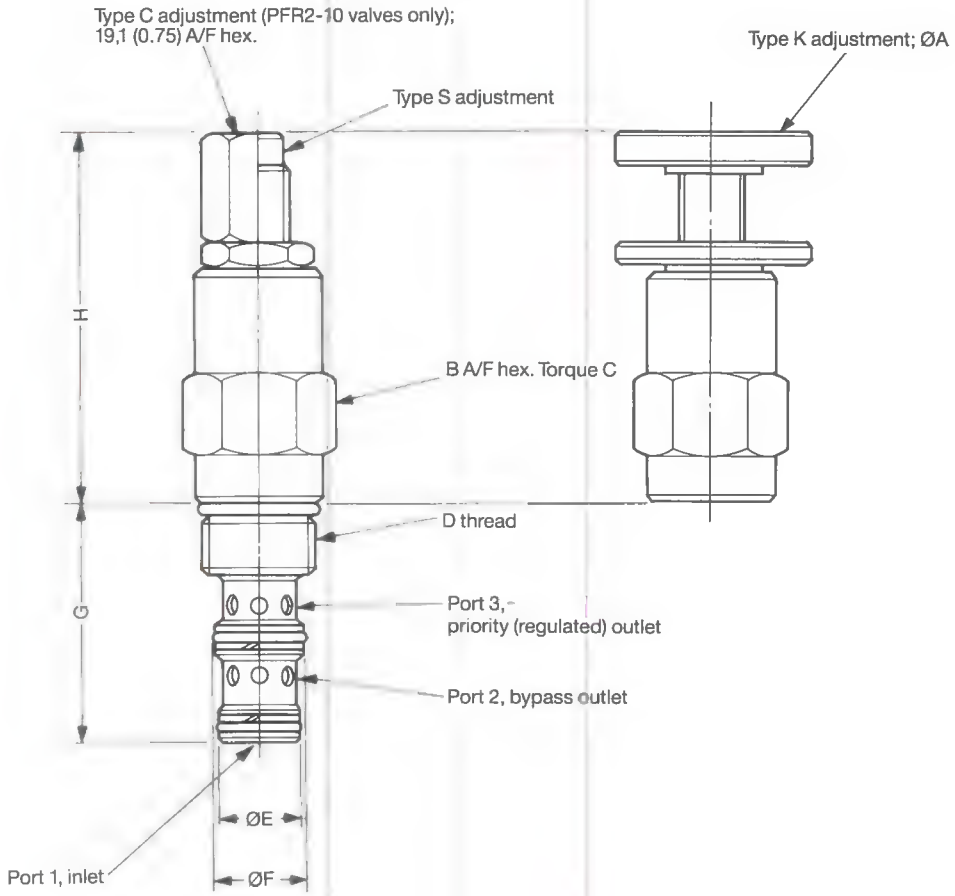
PFR2-10



PFR2-16



Installation dimensions in mm (inches)



Model	ØA	B	C	D	ØE	ØF	G	H
PFR2-10	38,1 (1.5)	25,4 (1.0)	47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,32 (0.682)	46,03 (1.812)	80 (3.15)
PFR2-16	51 (2.0)	38,1 (1.5)	109-122 Nm (80-90 lbf ft)	1.3125″-12 UN	26,95 (1.061) 26,90 (1.059)	28,55 (1.124) 28,50 (1.122)	73,03 (2.875)	104 (4.09)

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

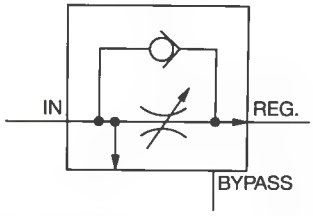
	Kit no.
PFR2-10-*	SK-10-3
PFR2-10V-*	SK-10V-3
PFR2-16-*	SK-16-3
PFR2-16V-*	SK-16V-3

Pressure compensated priority flow controls, three-way, adjustable series, with or without reverse free-flow check

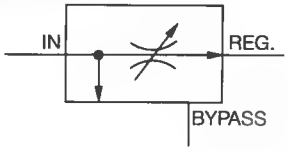
PFR4-10/16

Functional symbols

PFR4-10(V)-***-H1/H3/S1/S3 models

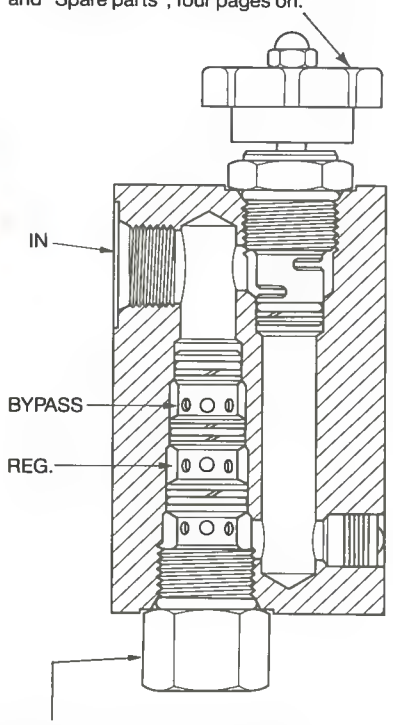


All other models



Typical section

Priority flow adjustment cartridge, MRV2 model shown; for other options see "Installation dimensions" three pages on and "Spare parts", four pages on.



Pressure compensator cartridge with bypass, PCS4 model. For details see "Spare parts", four pages on.

Model and ordering code

PFR4-(V)-***-****

1 2 3 4

1 Nominal size/maximum inlet flow
10 = 57 l/min (15 US gpm)
16 = 151 l/min (40 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
In light-duty housing;
207 bar (3000 psi) max.
PFR4-10 models
8T = With SAE 8 size ports
PFR4-16 models
12T = With SAE 12 size ports
16T = With SAE 16 size ports

4 Priority flow adjustment, priority flow range and reverse flow

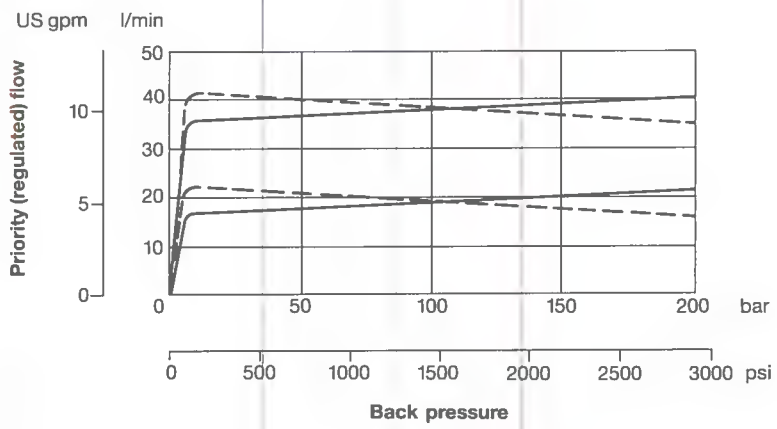
Code	Adjustment type	Priority (regulated) flow adjustment range l/min (US gpm)	Free reverse flow
For PFR4-10 models			
D1	Handlever with 10-position detent 180° turn	0,38-18,9 (0.1-5.0)	No
D2		0,38-34 (0.1-9.0)	No
H1	Knob with 3 × 360° turns	0,38-18,9 (0.1-5.0)	Yes
H2		0,38-34 (0.1-9.0)	No
H3		0,38-5,67 (0.1-1.5)	Yes
K1	Calibrated knob, 180° turn	0,38-18,9 (0.1-5.0)	No
K2		0,38-34 (0.1-9.0)	No
L1	Handlever with friction lock and 180° turn	0,38-18,9 (0.1-5.0)	No
L2		0,38-34 (0.1-9.0)	No
S1	Screwdriver adjustment with 3 × 360° turns	0,38-18,9 (0.1-5.0)	Yes
S2		0,38-34 (0.1-9.0)	No
S3		0,38-5,67 (0.1-1.5)	Yes
For PFR4-16 models			
D1	Handlever with 10-position detent 180° turn	0,38-37,8 (0.1-10)	No
D2		0,38-113 (0.1-30)	No
D3		0,38-75,7 (0.1-20)	No
K1	Calibrated knob with 180° turn	0,38-37,8 (0.1-10)	No
K2		0,38-113 (0.1-30)	No
K3		0,38-75,7 (0.1-20)	No
L1	Handlever with friction lock and 180° turn	0,38-37,8 (0.1-10)	No
L2		0,38-113 (0.1-30)	No
L3		0,38-75,7 (0.1-20)	No

Operating data Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)	
Max. pressure, all ports	207 bar (3000 psi)
Min. pressure drop, inlet minus priority outlet, for effective pressure compensation	6,9 bar (100 psi)
Regulated priority flow range	See [4] in "Model code" on previous page
Max. inlet flow	See [1] in "Model code" on previous page
Performance characteristics	See graphs below
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions	See next page
Mass: PFR4-10 PFR4-16	 1,24 kg (2.73 lb) approx. 4,54 kg (10.0 lb) approx.
Spare parts	See three pages on

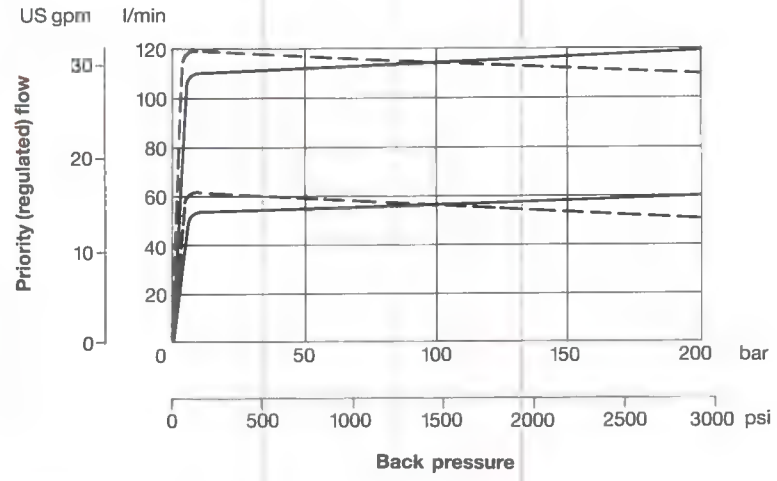
Performance characteristics
At various settings

——— With back pressure at priority (regulated) outlet
– – – – With back pressure at bypass outlet

PFR4-10



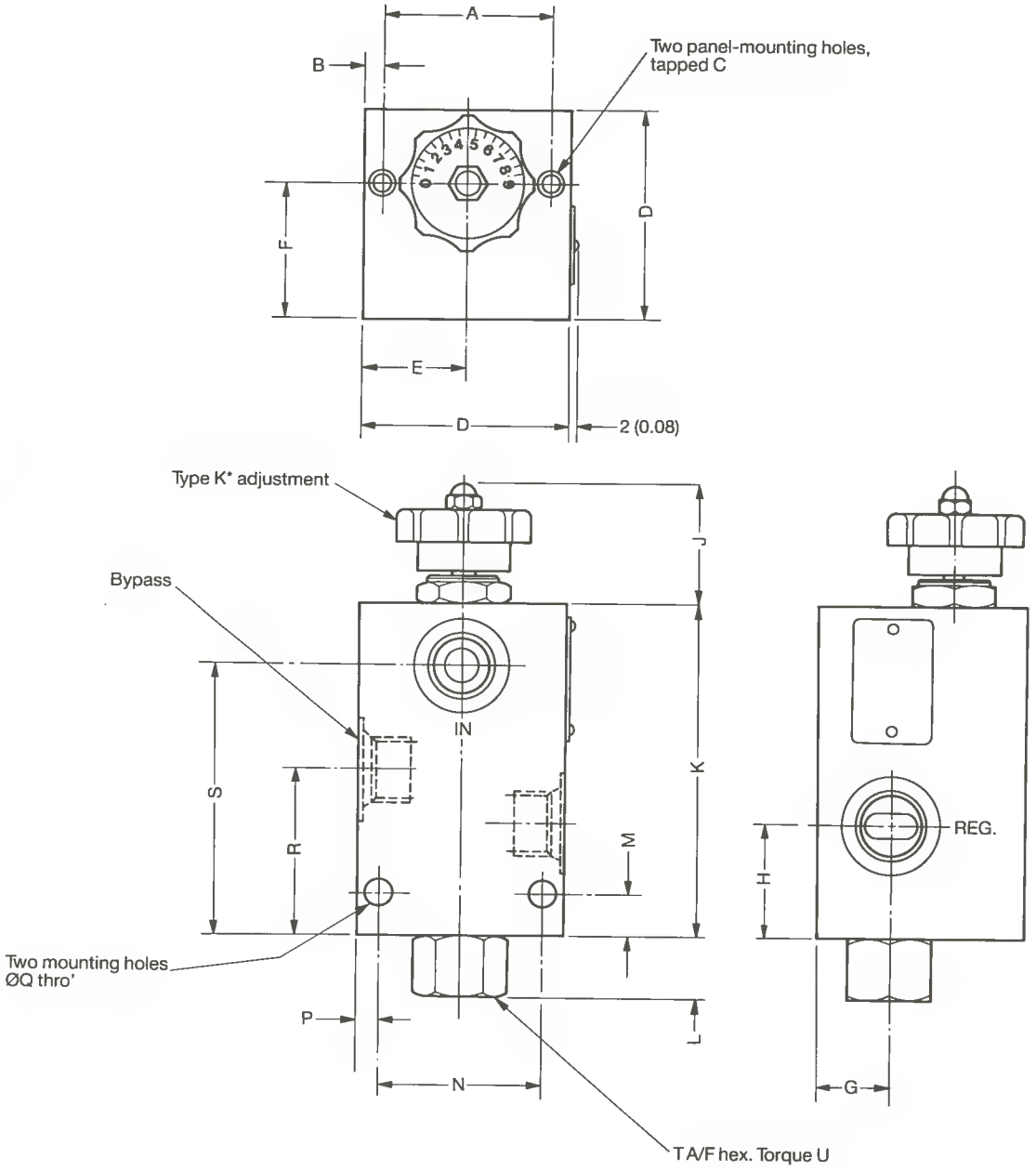
PFR4-16



Installation dimensions in mm (inches)

Models with type K* adjustment
For other adjustments see next page

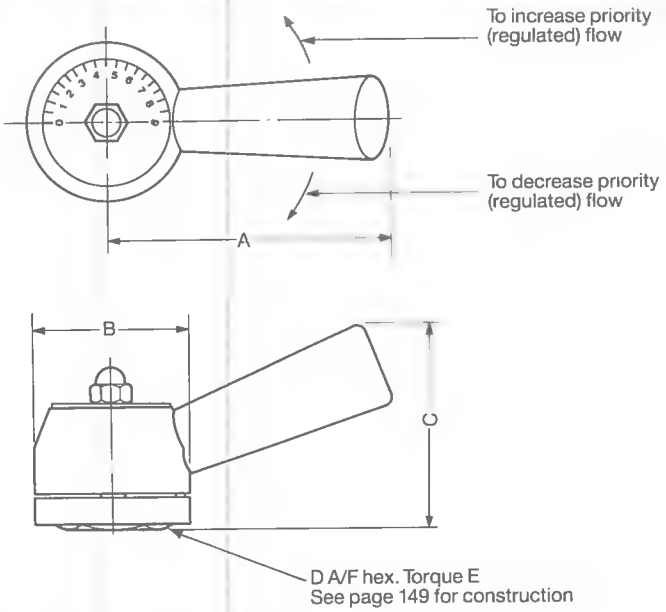
3rd angle projection



Model	A	B	C	D	E	F	G	H	J	K	L
PFR4-10	50,8 (2.0)	6,35 (0.25)	0.3125"-18 UNC × 15 (0.62) full thread	63,5 (2.5)	31,75 (1.25)	41,28 (1.625)	22,2 (0.875)	34,5 (1.36)	37 (1.45)	101,6 (4.0)	19,1 (0.75)
PFR4-16	76,2 (3.0)	12,7 (0.5)	0.50"-13 UNC × 25 (1.0) full thread	101,6 (4.0)	50,8 (2.0)	73,02 (2.875)	41,3 (1.625)	54,0 (2.13)	46 (1.81)	152,4 (6.00)	28,6 (1.13)

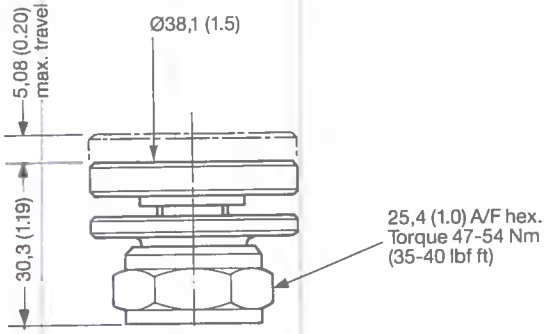
Model	M	N	P	ØQ	R	S	T	U
PFR4-10	12,7 (0.5)	50,8 (2.00)	6,35 (0.25)	8,7 (0.34)	50,42 (1.985)	82,55 (3.250)	2,54 (1.0)	47-54 Nm (35-40 lbf ft)
PFR4-16	22,1 (0.87)	76,2 (3.00)	12,7 (0.50)	11,1 (0.56)	82,55 (3.250)	126,2 (4.97)	38,1 (1.5)	109-122 Nm (80-90 lbf ft)

Type D* and L* adjustments

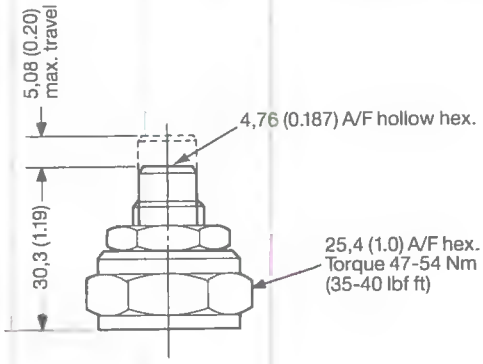


Model	A	B	C	D	E
PFR4-10	83 (3.27)	40,1 (1.58)	57,2 (2.25)	25,4 (1.0)	47-54 Nm (35-40 lbf ft)
PFR4-16	105 (4.13)	57,2 (2.25)	76,2 (3.0)	38,1 (1.5)	109-122 Nm (80-90 lbf ft)

Type H* adjustment
PFR4-10 models only



Type S* adjustment
PFR4-10 models only



Spare parts

The only parts available are complete cartridges and seal kits, the latter comprising external seals and back-up rings

a. Flow adjustment cartridges and related seal kits; for use with antiwear hydraulic oil only

For PFR4 valve	Cartridge	See page	Seal kit
PFR4-10-**T-D1	MRV2-10-D-0-05	149	SK-10-2
PFR4-10-**T-D2	MRV2-10-D-0-10	149	SK-10-2
PFR4-10-**T-H1	FCV6-10-K-0-FF	152	SK-10-2
PFR4-10-**T-H2	FCV6-10-K-0-NV	152	SK2-10-2
PFR4-10-**T-H3	FCV6-10-K-0-40	152	SK-10-2
PFR4-10-**T-K1	MRV2-10-K-0-05	146	SK-10-2
PFR4-10-**T-K2	MRV2-10-K-0-10	146	SK-10-2
PFR4-10-**T-L1	MRV2-10-L-0-05	149	SK-10-2
PFR4-10-**T-L2	MRV2-10-L-0-10	149	SK-10-2
PFR4-10-**T-S1	FCV6-10-S-0-FF	152	SK-10-2
PFR4-10-**T-S2	FCV6-10-S-0-NV	152	SK2-10-2
PFR4-10-**T-S3	FCV6-10-S-0-40	152	SK-10-2
PFR4-16-**T-D1	MRV2-16-D-0-10	149	SK-16-2
PFR4-16-**T-D2	MRV2-16-D-0-30	149	SK-16-2
PFR4-16-**T-D3	MRV2-16-D-0-20	149	SK-16-2
PFR4-16-**T-K1	MRV2-16-K-0-10	146	SK-16-2
PFR4-16-**T-K2	MRV2-16-K-0-30	146	SK-16-2
PFR4-16-**T-K3	MRV2-16-K-0-20	146	SK-16-2
PFR4-16-**T-L1	MRV2-16-L-0-10	149	SK-16-2
PFR4-16-**T-L2	MRV2-16-L-0-30	149	SK-16-2
PFR4-16-**T-L3	MRV2-16-L-0-20	149	SK-16-2

b. Flow adjustment cartridges and related seal kits for use with antiwear hydraulic oil or phosphate-ester

Model designations of valves, cartridges and seal kits are as listed above but with "V"-codes added as in the following example:

For PFR4 valve	Cartridge	Seal kit
PFR4-10**V**-**T-D1	MRV2-10**V**-D-0-05	SK-10**V**-2

c. Pressure compensator cartridges and related seal kits

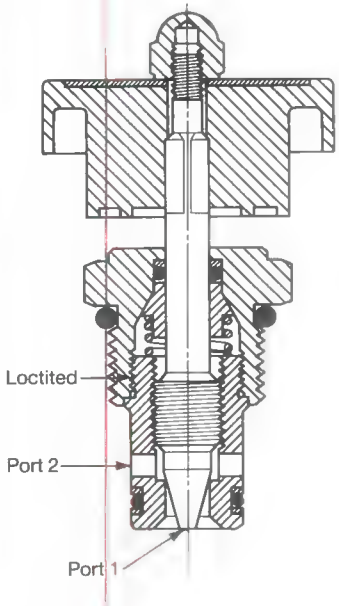
For PFR4 valve	Cartridge	See page	Seal kit
PFR4-10-**T	PCS4-10-0-160	236	SK3-10-4
PFR4-10V-**T	PCS4-10V-0-160	236	SK3-10V-4
PFR4-16-**T	PCS4-16-0-160	236	SK3-16-4
PFR4-16V-**T	PCS4-16V-0-160	236	SK3-16V-4

Flow restrictors, adjustable needle series

NV1-10

Functional symbol

Typical section



Model and ordering code

NV1-10(V)- * -**
[1] [2] [3]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Adjustment**
K = Knob (black)
R = Knob (red)

[3] **Form**
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

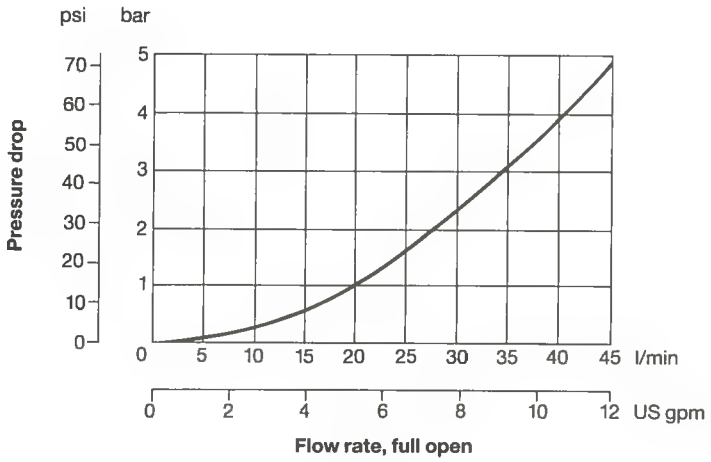
In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	45 l/min (12 US gpm)
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-2 For dimensions see page 247
Mass, cartridge only	0,11 kg (0.24 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

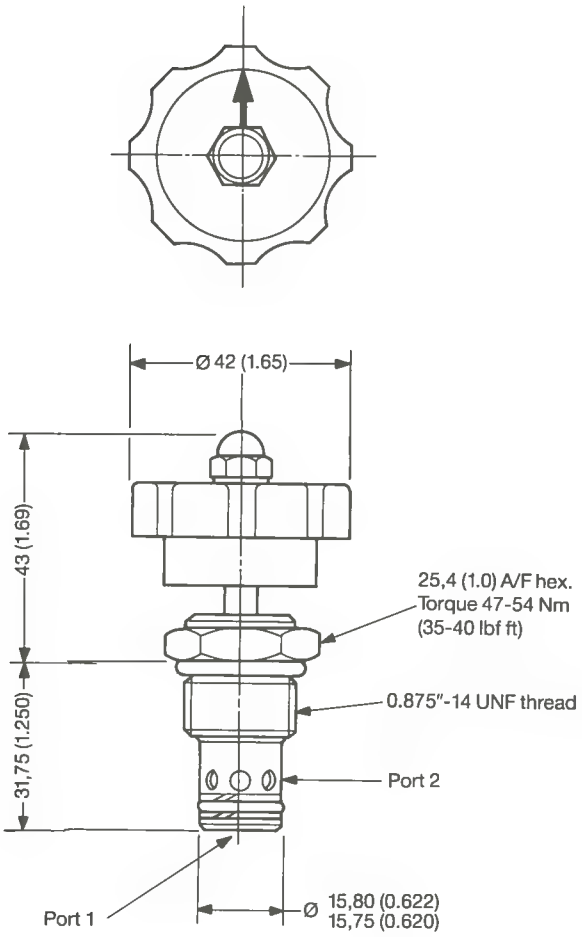
Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)

3rd angle projection



Spare parts

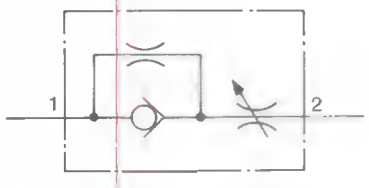
The only parts available are seal kits comprising external seals and back-up rings for:

	Kit no.
NV1-10-*	SK2-10-2
NV1-10V-*	SK2-10V-2

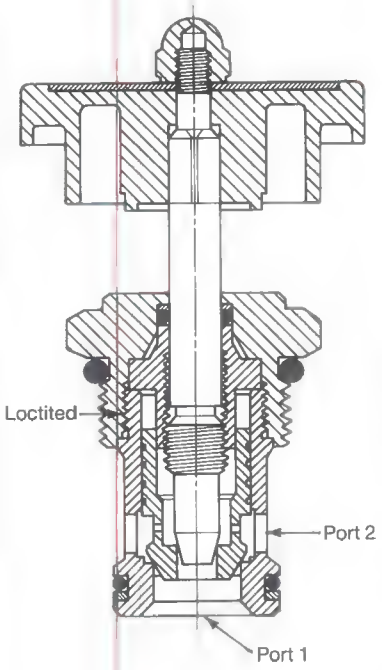
Flow restrictors, adjustable needle series, with in-line fixed restrictor in reverse flow mode

NV1-16/20

Functional symbol



Typical section



NV1-16
Similar construction for NV1-20

Model and ordering code

NV1-(V)-K-*****
1 2 3

1 Nominal size/rated flow
16 = 151 l/min (40 US gpm)
20 = 265 l/min (70 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
NV1-16 models
12T = With SAE 12 size ports
NV1-20 models
16T = With SAE 16 size ports

Continued in next column

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
NV1-16 models
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports
NV1-20 models
12H = With SAE 12 size ports
16H = With SAE 16 size ports
6G = With G¾" (BSPF) size ports
8G = With G1" (BSPF) size ports

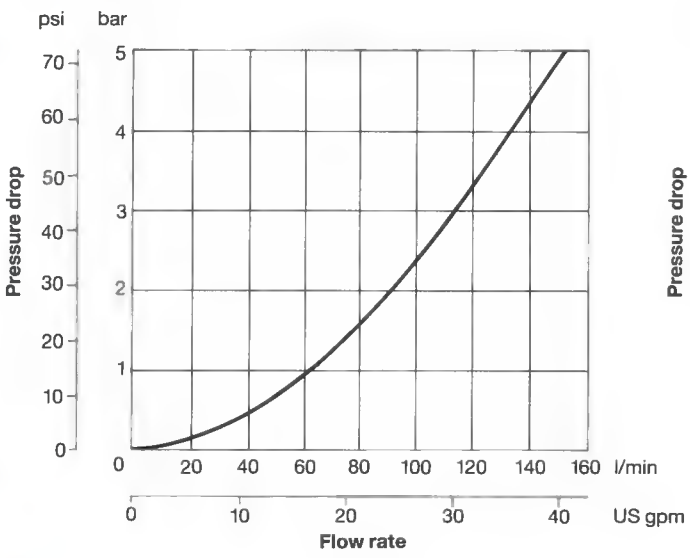
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	See 1 in "Model code" above
Pressure drop characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size: NV1-16 NV1-20	 C-16-2 C-20-2 For dimensions see page 247
Mass, cartridge only: NV1-16 NV1-20	 0,34 kg (0.76 lb) approx. 0,59 kg (1.3 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

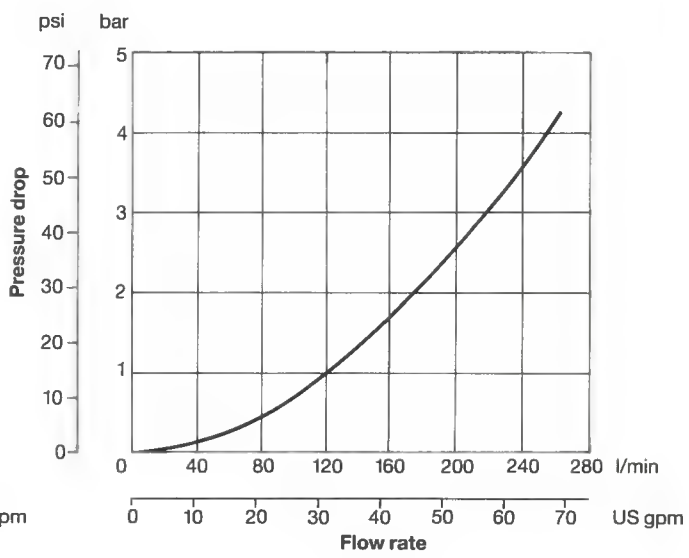
Pressure drop characteristics

Cartridges only, port 2 to 1

NV1-16

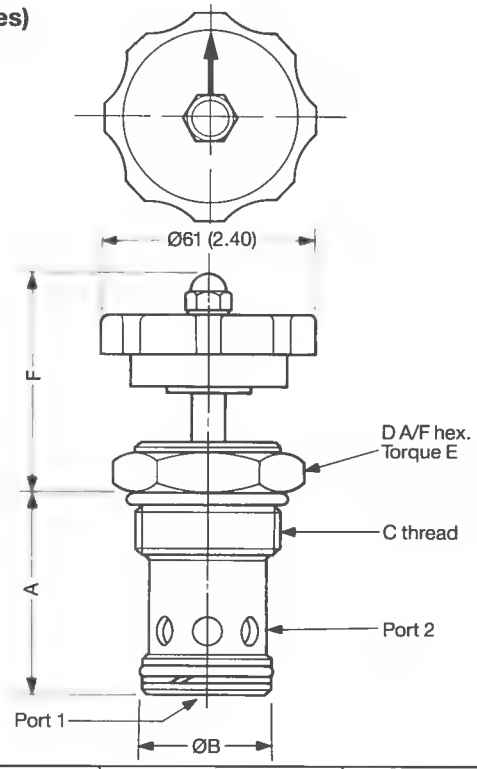


NV1-20



Installation dimensions in mm (inches)

3rd angle projection



Model	A	ØB	C	D	E	F
NV1-16	44,45 (1.750)	28,55 (1.124) 28,50 (1.122)	1.3125″-12 UN	38,10 (1.50)	109-122 Nm (80-90 lbf ft)	61 (2.40)
NV1-20	57,15 (2.250)	36,47 (1.436) 36,40 (1.433)	1.625″-12 UN	47,65 (1.875)	129-156 Nm (95-115 lbf ft)	62 (2.44)

Spare parts

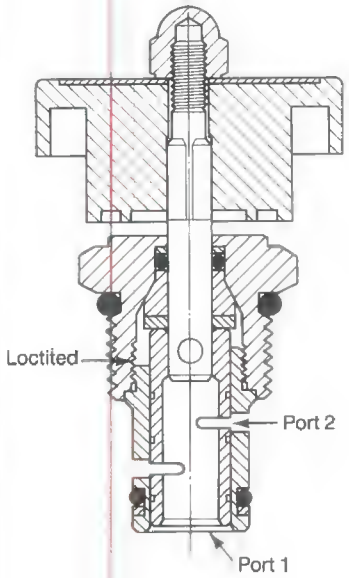
The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
NV1-16-K	SK-16-2
NV1-16V-K	SK-16V-2
NV1-20-K	SK-20-2
NV1-20V-K	SK-20V-2

Flow restrictors, semi-rotary spool series, knob operated

MRV2-10/16-K

Functional symbol

Typical section



MRV2-10(V)-K
Similar construction for MRV2-16(V)-K

Model and ordering code

MRV2-(V)-K-***-****
1 2 3 4

1 Nominal size/rated flow
10 = 57 l/min (15 US gpm)
16 = 170 l/min (45 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
MRV2-10 models
6T = With SAE 6 size ports
MRV2-16 models
12T = With SAE 12 size ports

Continued in next column

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
MRV2-10 models
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports
MRV2-16 models
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

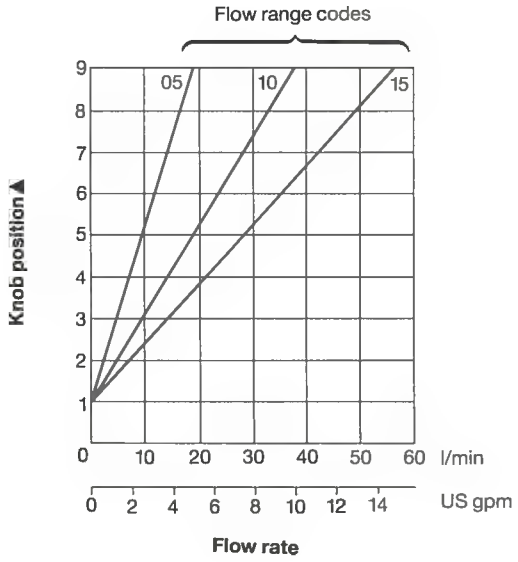
4 Maximum flow range, nominal, l/min (US gpm)
At 5,5 bar (80 psi) pressure drop under standard test conditions.
MRV2-10 models
05 = 0-18,9 (0-5)
10 = 0-37,8 (0-10)
15 = 0-56,7 (0-15)
MRV2-16 models
10 = 0-37,8 (0-10)
15 = 0-56,7 (0-15)
20 = 0-75,7 (0-20)
25 = 0-94,6 (0-25)
30 = 0-113,5 (0-30)
35 = 0-132,4 (0-35)
40 = 0-151,4 (0-40)
45 = 0-170,3 (0-45)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

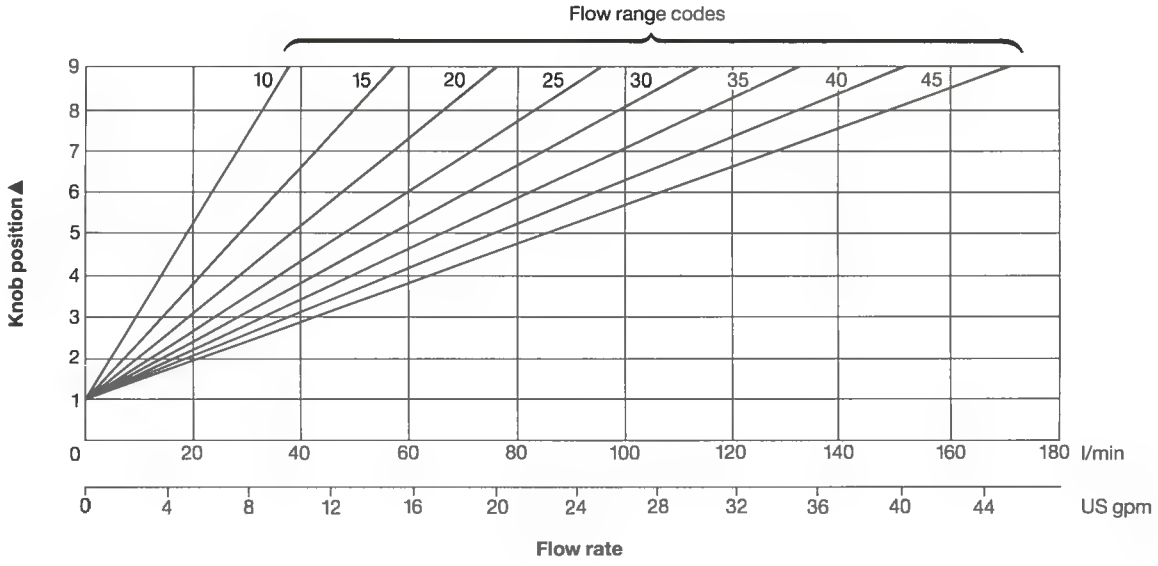
Max. pressure, both ports	207 bar (3000 psi)
Rated flow	See 1 in "Model code" above
Flow range options	See 4 in "Model code" above
Performance characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See two pages on
Cavity size: MRV2-10 MRV2-16	 C-10-2 C-16-2 For dimensions see page 247
Mass, cartridge only: MRV2-10 MRV2-16	 0,11 kg (0.24 lb) approx. 0,32 kg (0.71 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See two pages on

Performance characteristics
Cartridges only
At 5,5 bar (80 psi) pressure drop and under standard test conditions

MRV2-10



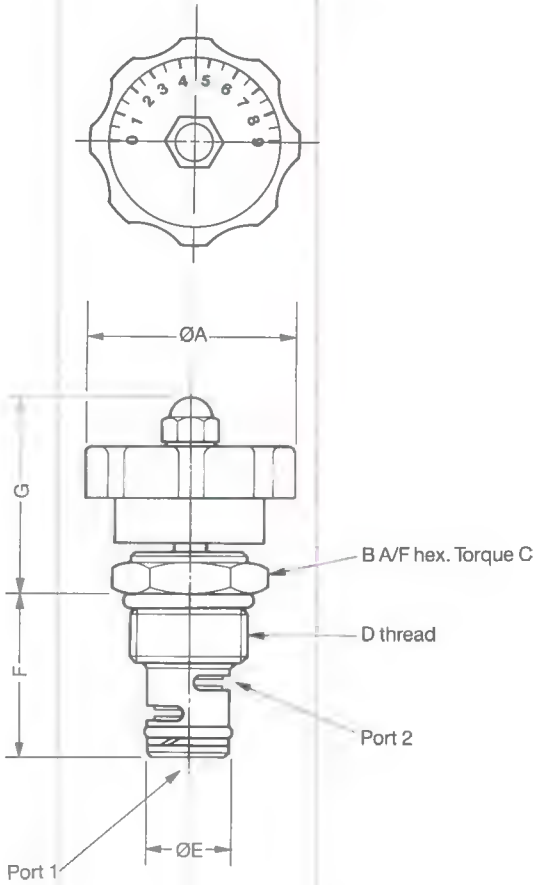
MRV2-16



▲ See "Installation dimensions" on next page

Installation dimensions in mm (inches)

3rd angle projection



Model	ØA	B	C	D	ØE	F	G
MRV2-10	42 (1.65)	25,4 (1.0)	47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	15,80 (0.622) 15,75 (0.620)	31,75 (1.250)	37 (1.45)
MRV2-16	6 (2.40)	38,1 (1.5)	109-122 Nm (80-90 lbf ft)	1.3125″-12 UN	28,55 (1.124) 28,50 (1.122)	44,45 (1.750)	46 (1.81)

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

	Kit no.
MRV2-10-K	SK-10-2
MRV2-10V-K	SK-10V-2
MRV2-16-K	SK-16-2
MRV2-16V-K	SK-16V-2

Flow restrictors, semi-rotary spool series, lever operated

MRV2-10/16-B/E/D/L

Functional symbol

Model and ordering code

MRV2-(V)-* - *** - ****

1 2 3 4 5

1 Nominal size/rated flow
10 = 57 l/min (15 US gpm)
16 = 170 l/min (45 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Adjustment
B = Friction lock ball-lever, MRV2-10 models only
E = 10-position detent ball-lever, MRV2-10 models only
D = 10-position detent lever
L = Friction-lock lever

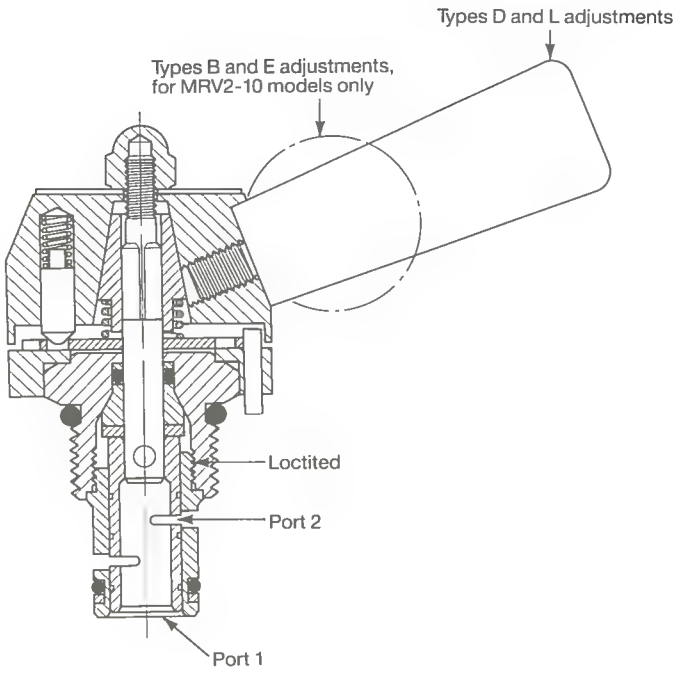
4 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
MRV2-10 models
6T = With SAE 6 size ports
MRV2-16 models
12T = With SAE 12 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
MRV2-10 models
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports
MRV2-16 models
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

5 Maximum flow range, nominal, l/min (US gpm)
At 5,5 bar (80 psi) pressure drop under standard test conditions.
MRV2-10 models
05 = 0-18,9 (0-5)
10 = 0-37,8 (0-10)
15 = 0-56,7 (0-15)
MRV2-16 models
10 = 0-37,8 (0-10)
15 = 0-56,7 (0-15)
20 = 0-75,7 (0-20)
25 = 0-94,6 (0-25)
30 = 0-113,5 (0-30)
35 = 0-132,4 (0-35)
40 = 0-151,4 (0-40)
45 = 0-170,3 (0-45)

Typical section



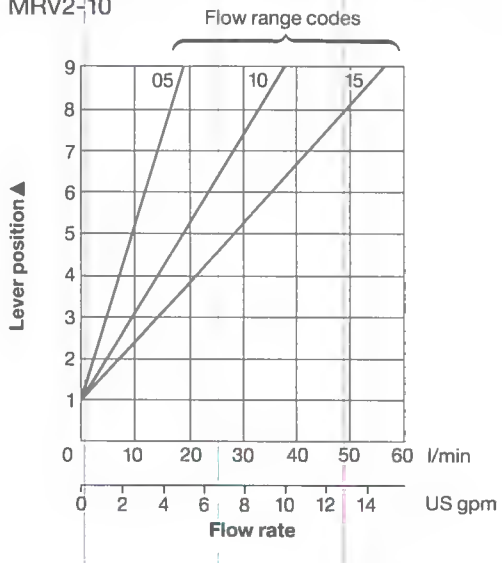
MRV2-10
Similar construction for MRV2-16

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

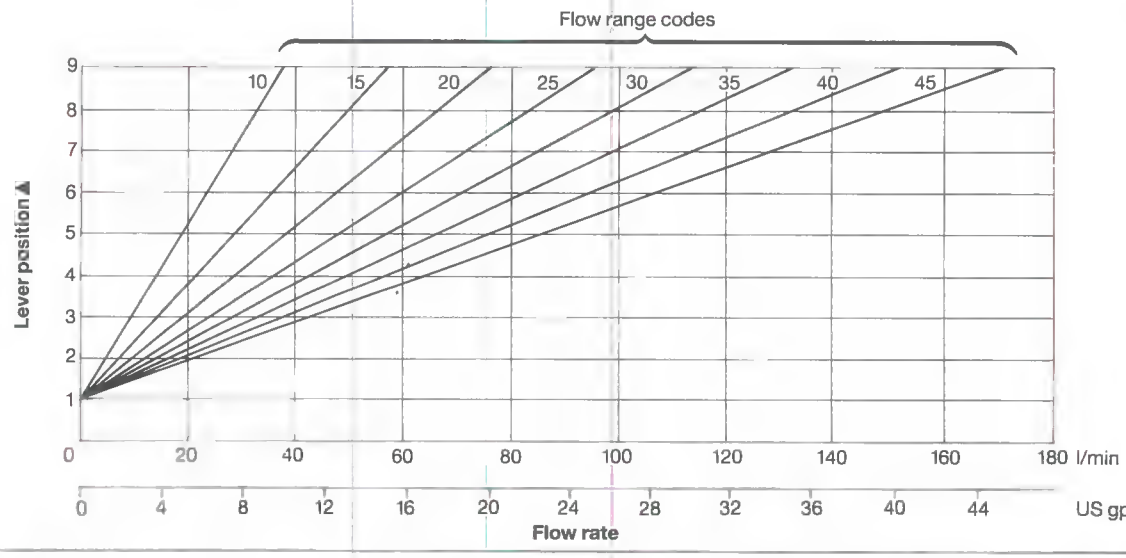
Max. pressure, both ports	207 bar (3000 psi)
Rated flow	See [1] in "Model code" on previous page
Flow range options	See [5] in "Model code" on previous page
Performance characteristics	See graphs below
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size: MRV2-10 MRV2-16	 C-10-2 C-16-2 For dimensions see page 247
Mass, cartridge only: MRV2-10 MRV2-16	 0,20 kg (0.45 lb) approx. 0,79 kg (1.74 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

Performance characteristics
At 5,5 bar (80 psi) pressure drop and under standard test conditions

MRV2-10



MRV2-16

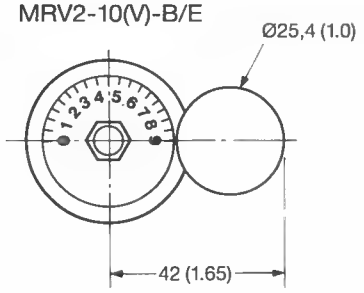


▲ See "Installation dimensions" on next page

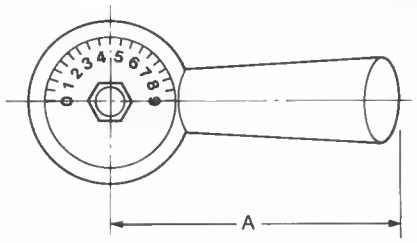
Installation dimensions in mm (inches)

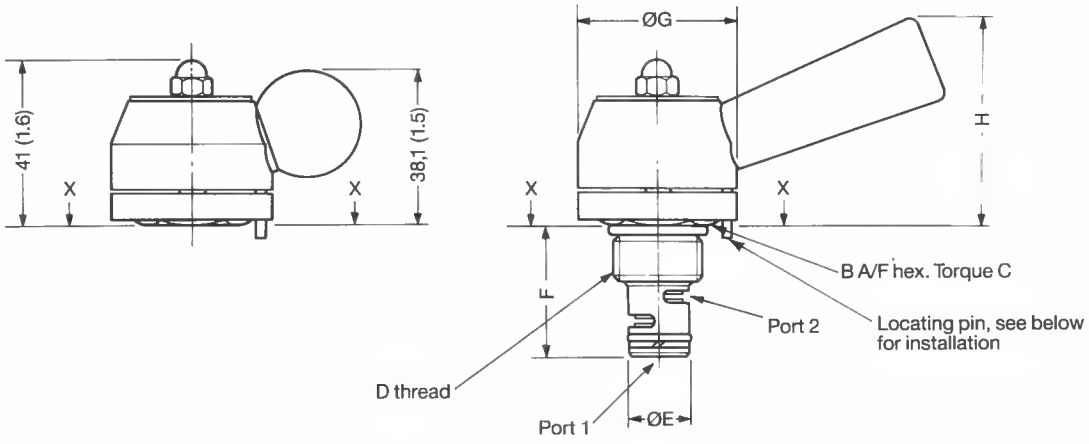
3rd angle projection

MRV2-10(V)-B/E



MRV2-**(V)-D/L

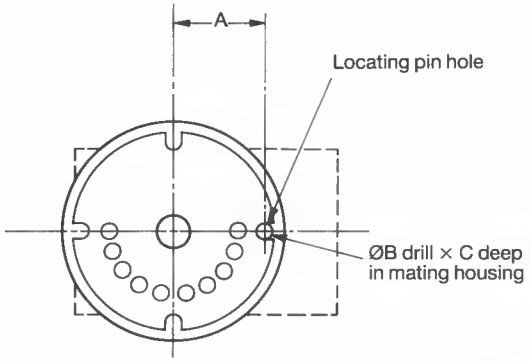




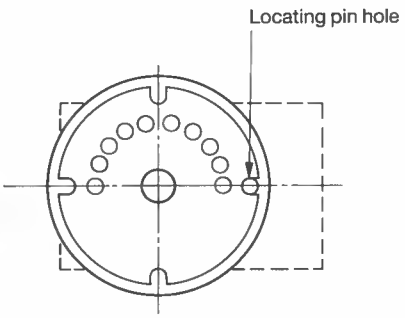
Model	A	B	C	D	ØE	F	ØG	H
MRV2-10	83 (3.26)	25,4 (1.0)	47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	15,80 (0.622) 15,75 (0.620)	31,75 (1.250)	41 (1.6)	58 (2.28)
MRV2-16	105 (4.13)	38,1 (1.5)	109-122 Nm (80-90 lbf ft)	1.3125″-12 UN	28,55 (1.124) 28,50 (1.122)	44,45 (1.750)	58 (2.28)	76 (3.0)

Locating pin hole, views on X-X

MRV2-**(V)-E/D models



MRV2-**(V)-B/L models



Model	A	ØB	C
MRV2-10	17,07 (0.672)	3,45 3,50 ($\#29$ or $0.136^{\ 0}_{+0.002}$)	4,76 (0.187)
MRV2-16	24,89 (0.980)		

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
MRV2-10-*	SK-10-2
MRV2-10V-*	SK-10V-2
MRV2-16-*	SK-16-2
MRV2-16V-*	SK-16V-2

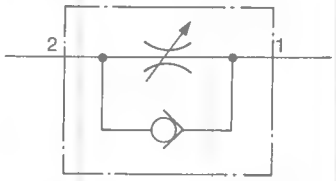
Flow restrictors, adjustable needle series, with and without reverse free-flow check

FCV6-10

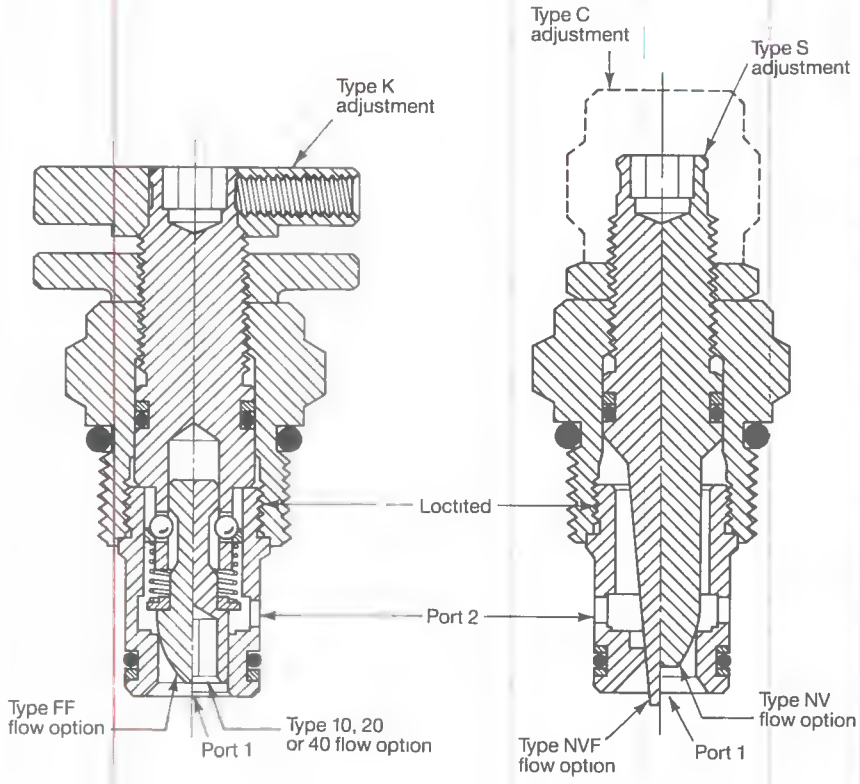
Functional symbols

FCV6-10(V)-*-NV(F)

FCV6-10(V)-*-FF/10/20/40



Typical sections



Model and ordering code

FCV6-10(V)- * --*****

1 2 3 4

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Adjustment
K = Knob
S = Screw
C = Cap

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

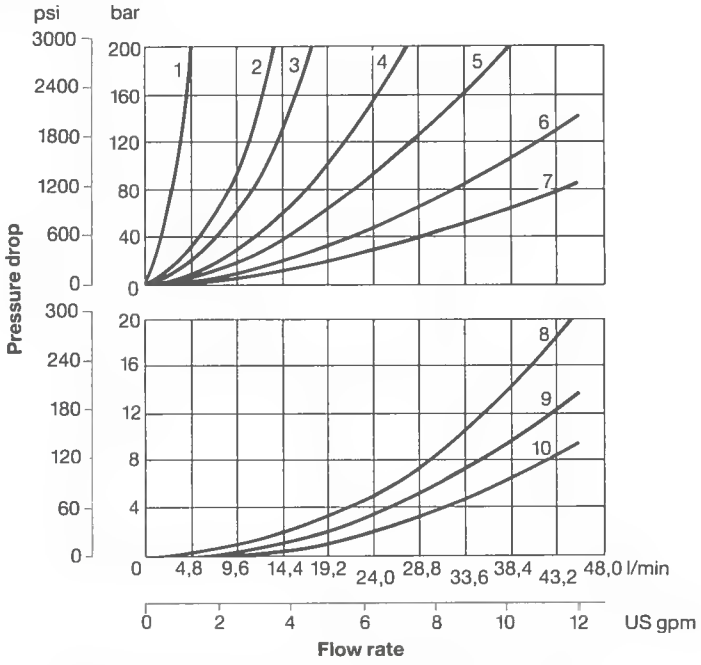
In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

4 Controlled flow option
(See graphs on next page for selection)
NV = Needle valve
NVF = Needle valve, fine needle
FF = Needle valve with free reverse flow
10 = Flow range, type 10, with free reverse flow
20 = Flow range, type 20, with free reverse flow
40 = Flow range, type 40, with free reverse flow

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	45 l/min (12 US gpm)
Pressure drop characteristics	See graphs below
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-2 For dimensions see page 247
Mass, cartridge only	0,13 kg (0.28 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

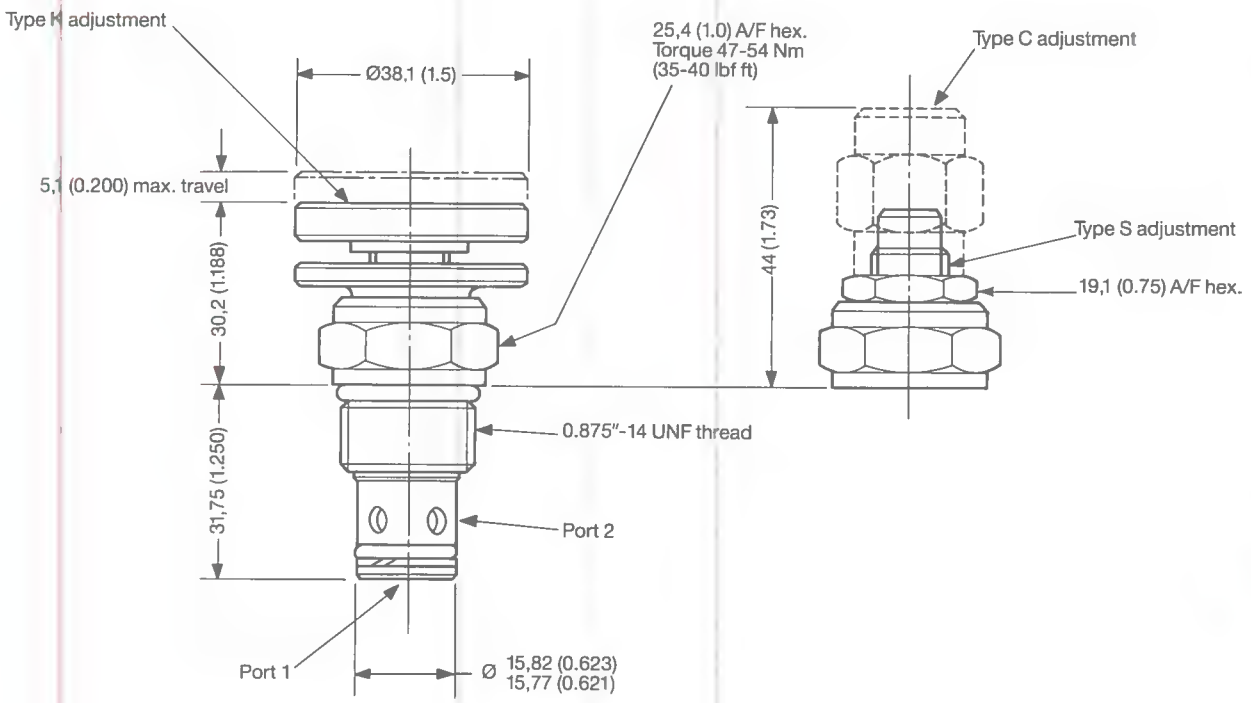
Pressure drop characteristics
Cartridges only



Curve	Code option▲	Flow direction, port:	Valve condition
1	10	2 to 1 1 to 2	Open Closed
2	20	2 to 1 1 to 2	Open Closed
3	10	1 to 2	Open
4	40	2 to 1 1 to 2	Open Closed
5	NVF	Both directions	Open
6	20	1 to 2	Open
7	40	1 to 2	Open
8	FF	2 to 1	Open
9	FF	1 to 2	Open and closed
10	NV	Both directions	Open

▲ See [4] in "Model code" on previous page

Installation dimensions in mm (inches)



Spare parts

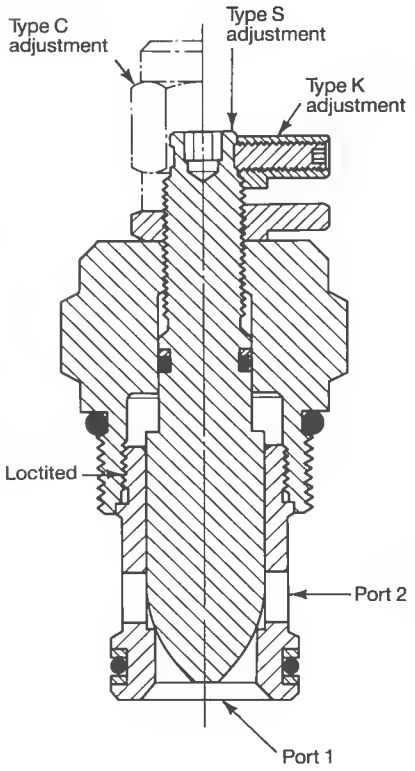
The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
FCV6-10-FF/10/20/40	SK-10-2
FCV6-10-NV(F)	SK2-10-2
FCV6-10V-FF/10/20/40	SK-10V-2
FCV6-10V-NV(F)	SK2-10V-2

Flow restrictors, adjustable needle series

FCV6-16

Functional symbol

Typical section



Model and ordering code

FCV6-16(V)- * -*-NV**
1 2 3

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Adjustment
C = Cap
K = Knob
S = Screw

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size ports

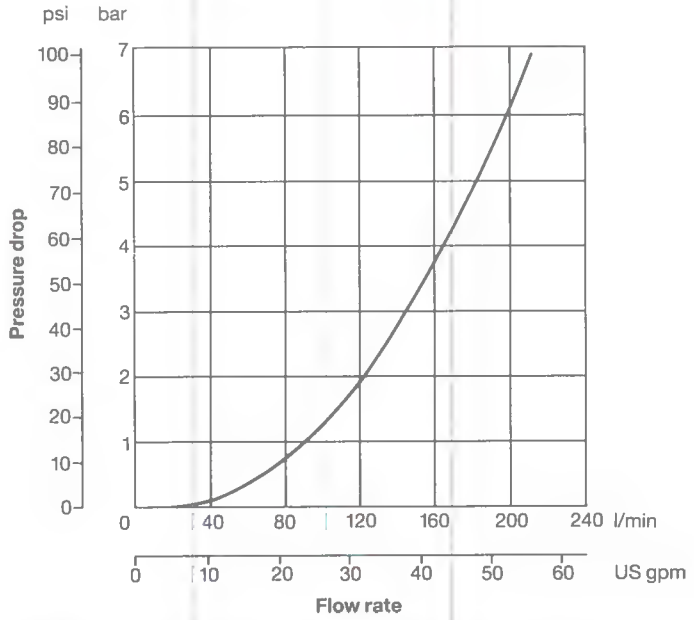
In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

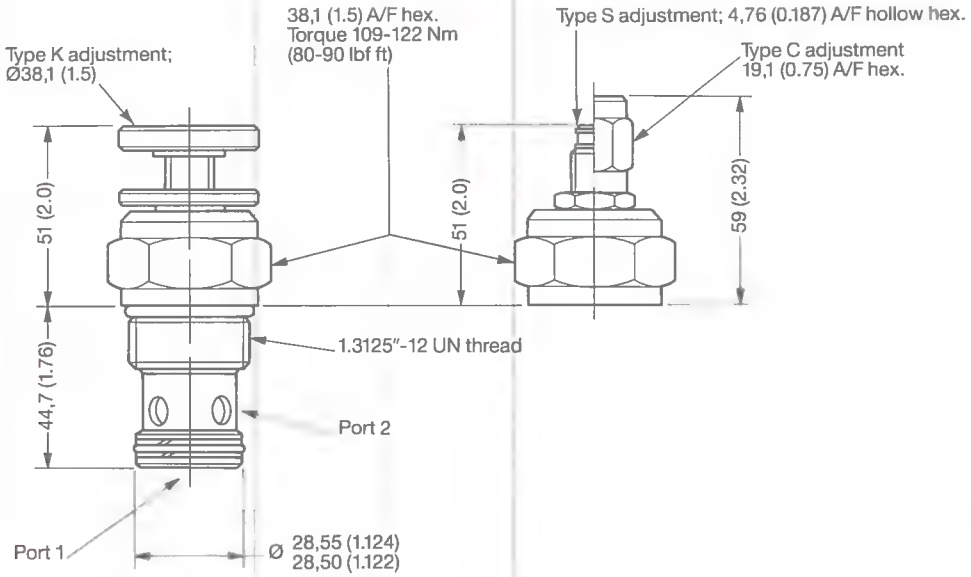
Max. pressure, both ports	207 bar (3000 psi)
Rated flow	208 l/min (55 US gpm)
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 1 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-2 For dimensions see page 247
Mass, cartridge only	0,37 kg (0.81 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)



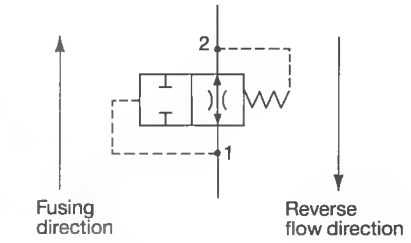
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
FCV6-16-*	SK3-16-2
FCV6-16V-*	SK3-16V-2

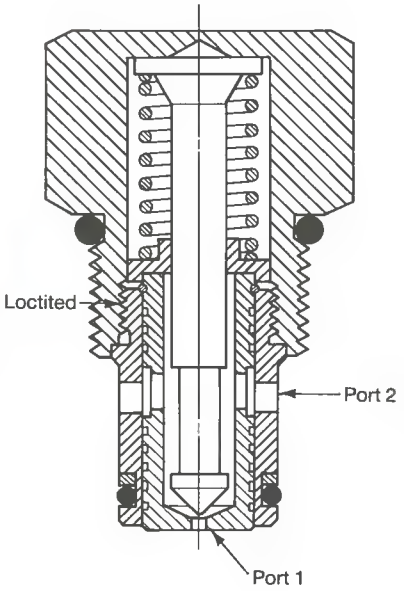
Velocity fuses (pipe-break valves)

VF1-10/16/20

Functional symbol



Typical section



Model and ordering code

VF1-(V)-F-**-*****
1 2 3 4

1 Nominal size
10, 16 or 20. See 4 below

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
VF1-10 models
6T = With SAE 6 size ports
VF1-16 models
12T = With SAE 12 size ports
VF1-20 models
16T = With SAE 16 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
VF1-10 models
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

Continued in next column

VF1-16 models
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports
VF1-20 models
12H = With SAE 12 size ports
16H = With SAE 16 size ports
6G = With G¾" (BSPF) size ports
8G = With G1" (BSPF) size ports

4 Factory-set maximum flow rate, nominal
Specify required flow code (US gpm value) (1 US gpm = 3,7853 l/min) e.g.
0.5 = 1,89 l/min (0.5 US gpm)
20 = 75,7 l/min (20 US gpm)

Required flow rates must be within:
1,9-22,7 l/min (0.5-6 US gpm), for VF1-10 valves
1,9-113 l/min (0.5-30 US gpm), for VF1-16 valves
3,8-227 l/min (1.0-60 US gpm), for VF1-20 valves

Minimum increment for factory-set flow = 1,9 l/min (0.5 US gpm)
Accuracy of factory-set flow under standard test conditions = +20%, −0

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

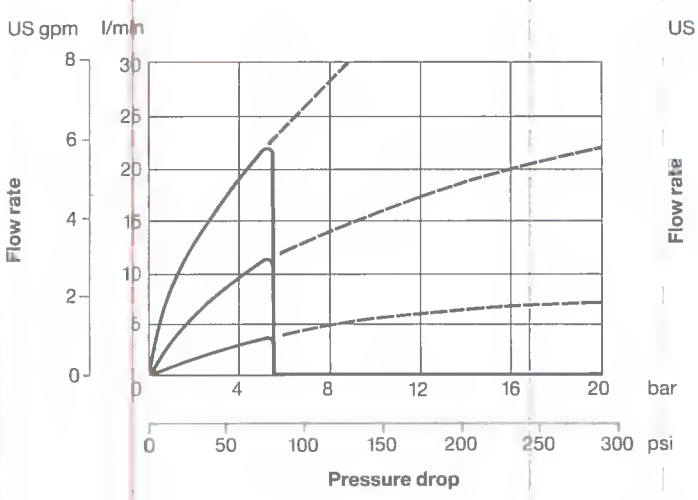
Usage	Allows fusing flow up to a preset maximum at Δp = 5,5 bar (80 psi). The valve shuts at higher Δp values thus preventing further flow in the fusing direction until Δp falls below 5,5 bar (80 psi). Reverse flow is under normal conditions.
Max. pressure, both ports	207 bar (3000 psi)
Max. flow rate	See 4 in "Model code" above
Performance characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See two pages on

Continued on next page

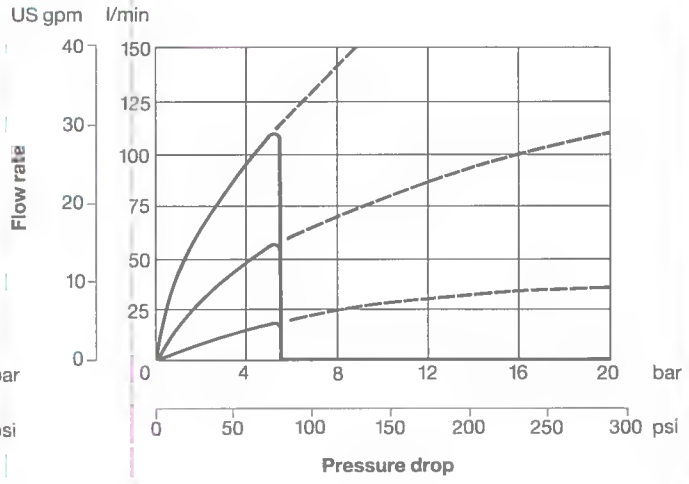
Cavity size for:	
VF1-10	C-10-2
VF1-16	C-16-2
VF1-20	C-20-2
	For dimensions see page 247
Mass, cartridge only:	
VF1-10	0,11 kg (0.25 lb) approx.
VF1-16	0,33 kg (0.72 lb) approx.
VF1-20	0,82 kg (1.80 lb) approx.
Housing options:	
Standard light-duty type	See page 255
Standard fatigue-rated type	See page 251
Customized types	Consult your local sales engineer
Spare parts	See next page

Performance characteristics
Cartridges only
—— Port 1 to 2, fusing direction
– – – Port 2 to 1, reverse flow down to 0
Performance of three different factory-set models per valve size.

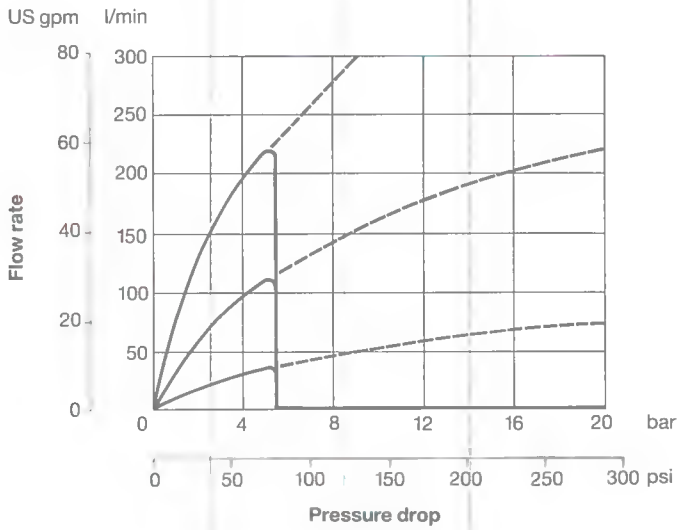
VF1-10



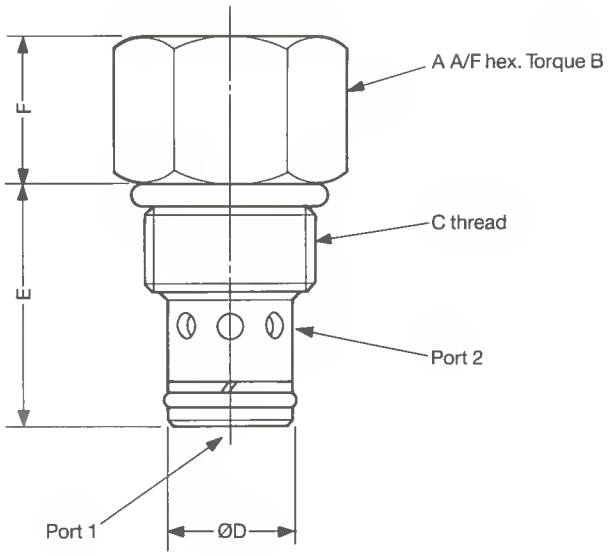
VF1-16



VF1-20



Installation dimensions in mm (inches)



Model	A	B	C	ØD	E	F
VF1-10	25,4 (1.0)	47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	15,82 (0.623) 15,77 (0.621)	31,75 (1.250)	19 (0.75)
VF1-16	38,1 (1.5)	109-122 Nm (80-90 lbf ft)	1.3125″-12 UN	28,55 (1.124) 28,50 (1.122)	44,45 (1.750)	29 (1.13)
VF1-20	47,6 (1.875)	129-156 Nm (95-115 lbf ft)	1.625″-12 UN	36,47 (1.436) 36,40 (1.433)	57,15 (2.250)	38,1 (1.5)

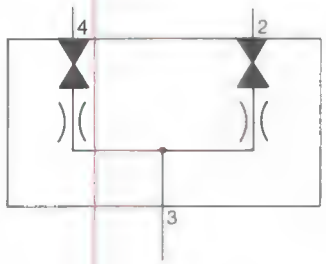
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
VF1-10-F	SK-10-2
VF1-10V-F	SK-10V-2
VF1-16-F	SK-16-2
VF1-16V-F	SK-16V-2
VF1-20-F	SK-20-2
VF1-20V-F	SK-20V-2

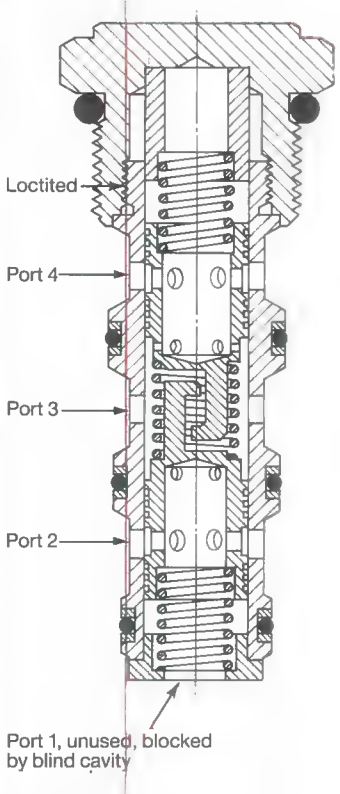
Flow divider-combiners, pressure compensated series

FDC1-10/16

Functional symbol



Typical section



FDC1-10
Similar construction for FDC1-16

Model and ordering code

FDC1-(V)-*** - ****
1 2 3 4

1 Nominal size/rated flow
10 = 45 l/min (12 US gpm)
16 = 151 l/min (40 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
FDC1-10 models
6T = With SAE 6 size ports
FDC1-16 models
12T = With SAE 12 size ports

4 Flow division, nominal

Code	Flow division % Port 4	Port 2	Inlet flow range, l/min (US gpm) FDC1-10 models
.5.5	50	50	1,3-4,9 (0.33-1.33)
11	50	50	2,8-10,9 (0.74-2.9)
22	50	50	5,7-22,7 (1.5-6)
33	50	50	8,4-34 (2.2-9)
44	50	50	11,4-43,5 (3-11.5)
66	50	50	17-68 (4.5-18)
88	50	50	23-87 (6-23)
64	60	40	14-56,7 (3.7-15)
46	40	60	14-56,7 (3.7-15)
63	67	33	12,5-51 (3.3-13.5)
36	33	67	12,5-51 (3.3-13.5)
43	57	43	9,9-39,7 (2.6-10.5)
34	43	57	9,9-39,7 (2.6-10.5)

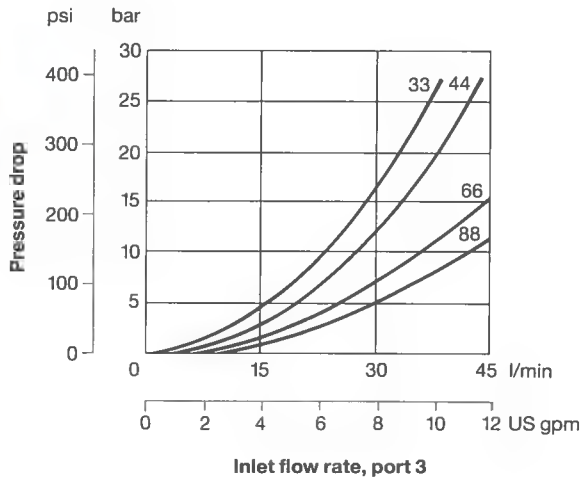
Code	Flow division % Port 4	Port 2	Inlet flow range, l/min (US gpm) FDC1-16 models
33	50	50	16,7-68 (4.4-18)
44	50	50	22,4-90 (5.9-24)
55	50	50	28-113 (7.4-30)
66	50	50	33,3-132 (8.8-35)
88	50	50	44,7-178 (11.8-47)
64	60	40	28-113 (7.4-30)
46	40	60	28-113 (7.4-30)
63	67	33	25-98 (6.6-26)
36	33	67	25-98 (6.6-26)
43	57	43	19,7-79 (5.2-21)
34	43	57	19,7-79 (5.2-21)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

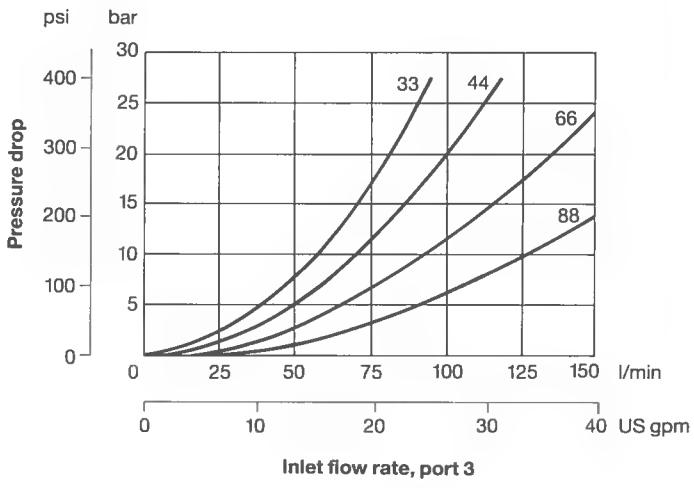
Max. pressure, all ports	207 bar (3000 psi)
Rated flow	See [1] in "Model code" on previous page
Max. inlet flow: FDC1-10 FDC1-16	 68 l/min (18 US gpm) 178 l/min (47 US gpm)
Flow division: Nominal Accuracy	 See [4] in "Model code" on previous page ±10% under standard test conditions
Pressure drop characteristics	See graphs below
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size: FDC1-10 FDC1-16	 C-10-4 C-16-4 For dimensions see page 247
Mass, cartridge only: FDC1-10 FDC1-16	 0,10 kg (0.22 lb) approx. 0,35 kg (0.78 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 258 Not suitable for FDC1 valves Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only

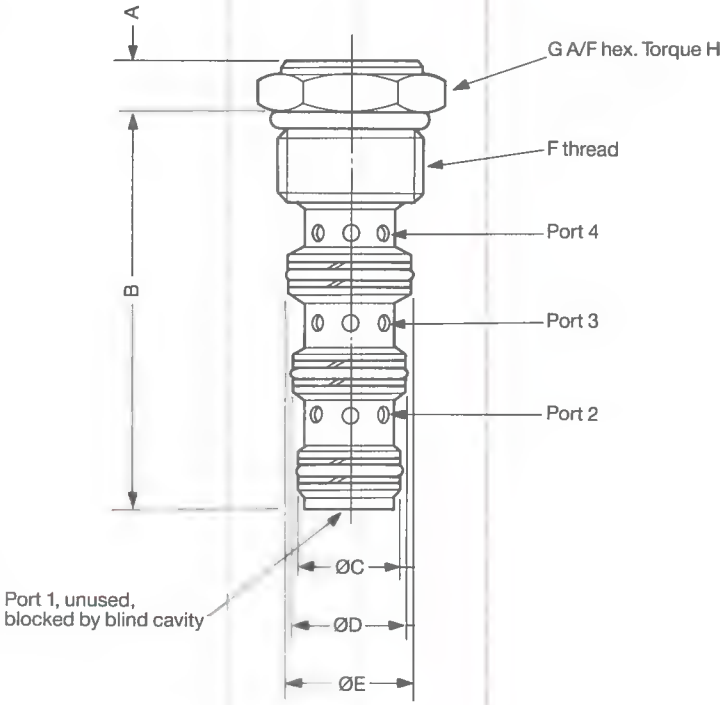
FDC1-10
Flow division codes 33, 44, 66 and 88



FDC1-16
Flow division codes 33, 44, 66 and 88



Installation dimensions in mm (inches)



Model	A	B	ØC	ØD
FDC1-10	8 (0.31)	63,9 (2.516)	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)
FDC1-16	13 (0.51)	104,78 (4.125)	25,37 (0.999) 25,32 (0.997)	26,95 (1.061) 26,90 (1.059)

Model	ØE	F	G	H
FDC1-10	18,97 (0.747) 18,92 (0.745)	0.875″-14 UNF	25,4 (1.0)	47-54 Nm (35-40 lbf ft)
FDC1-16	28,55 (1.124) 28,50 (1.122)	1.3125″-12 UN	38,1 (1.5)	109-122 Nm (80-90 lbf ft)

Spare parts

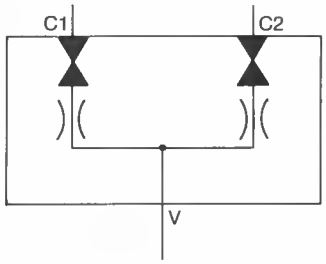
The only parts available are seal kits comprising external seals and back-up rings for:

	Kit no.
FDC1-10-*	SK2-10-4
FDC1-10V-*	SK2-10V-4
FDC1-16-*	SK2-16-4
FDC1-16V-*	SK2-16V-4

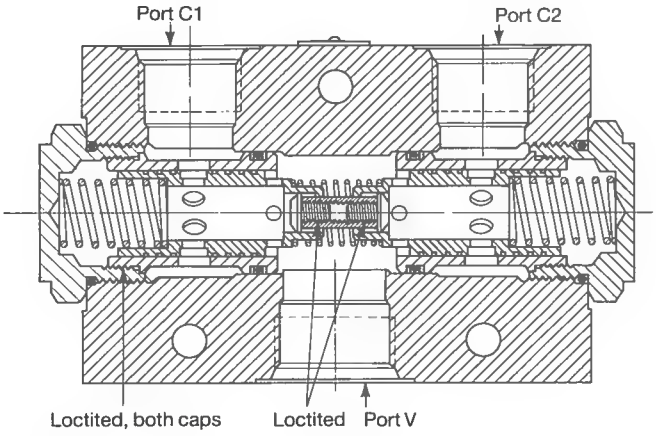
Flow divider-combiners, pressure compensated series

FDC1-20

Functional symbol



Typical section



Model and ordering code

FDC1-20(V)-16T-**

[1] [2]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Flow division, nominal**

Code	Flow division % Port C1	Port C2
33	50	50
44	50	50
66	50	50
88	50	50
46	40	60
36	33	67
34	43	57

Code	Inlet flow range l/min (US gpm)
33	73,8-295 (19.5-78)
44	98,5-393 (26-104)
66	148-590 (39-156)
88	197-787 (52-208)
46	125-492 (33-130)
36	110-442 (29-117)
34	87-340 (23-90)

For other flow rates and flow divisions consult your local sales engineer.

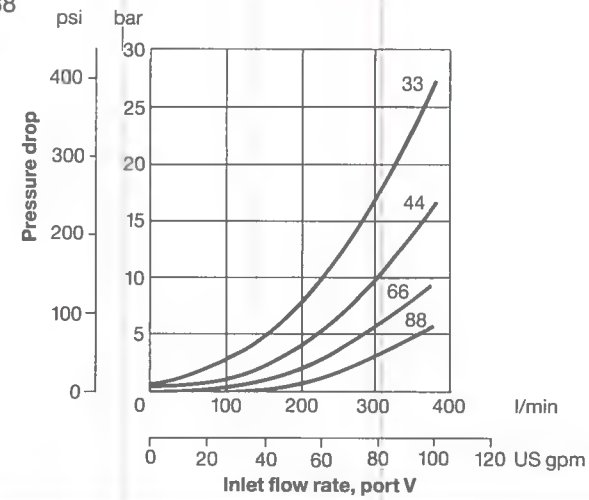
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)
Rated flow	378 l/min (100 US gpm)
Max. inlet flow	568 l/min (150 US gpm)
Flow division: Nominal Accuracy	 See [2] in "Model code" above ±10% under standard test conditions
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" and also page 266
Installation dimensions	See next page
Mass	2,6 kg (5.75 lb) approx.

Continued on next page

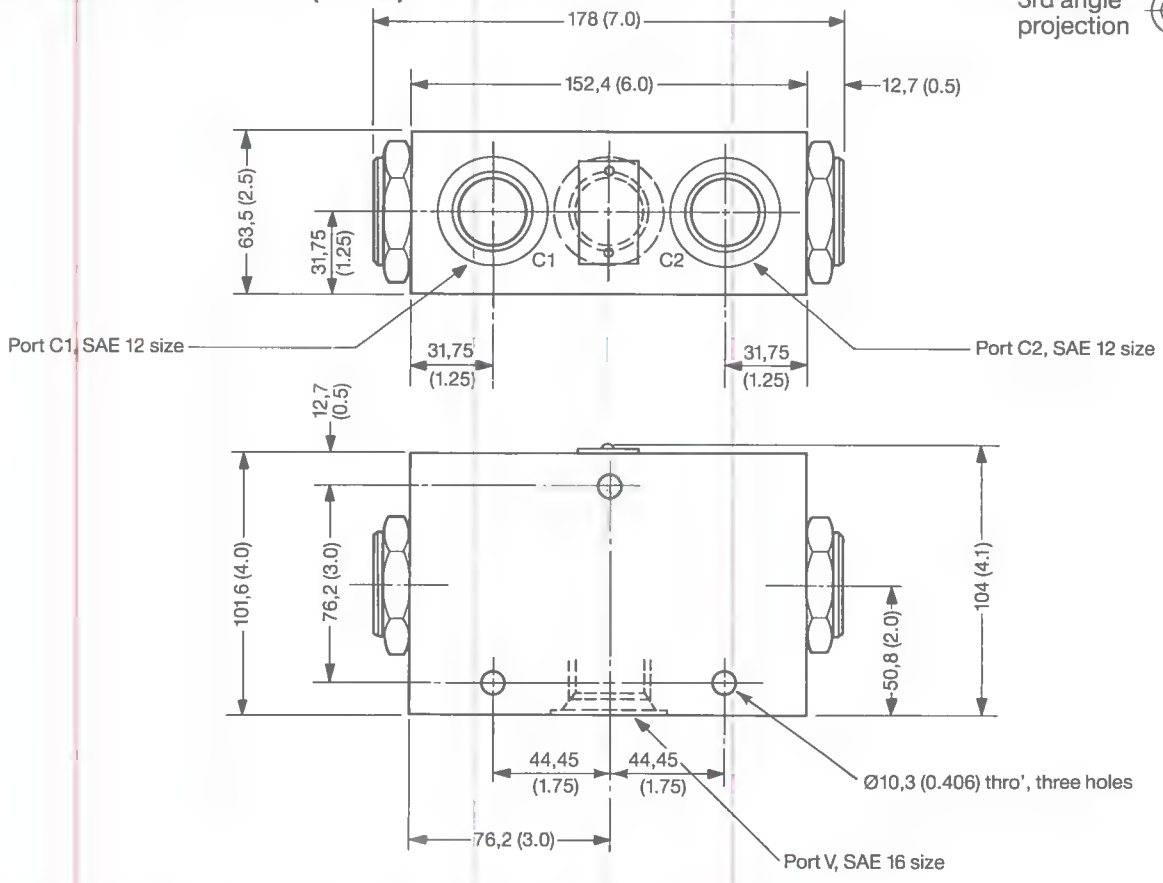
Housing options:	
Standard light-duty type	As shown
Customized types	Consult your local sales engineer
Spare parts	See below

Pressure drop characteristics
Cartridges only
Flow division codes 33, 44, 66 and 88



Installation dimensions in mm (inches)

3rd angle projection



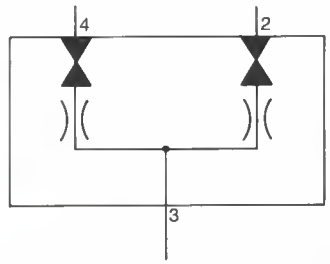
Spare parts

The only parts available are seal kits (two per valve) comprising cartridge seals and back-up rings for:	Kit no.
FDC1-20-16T	SK2-20-2
FDC1-20V-16T	SK2-20V-2

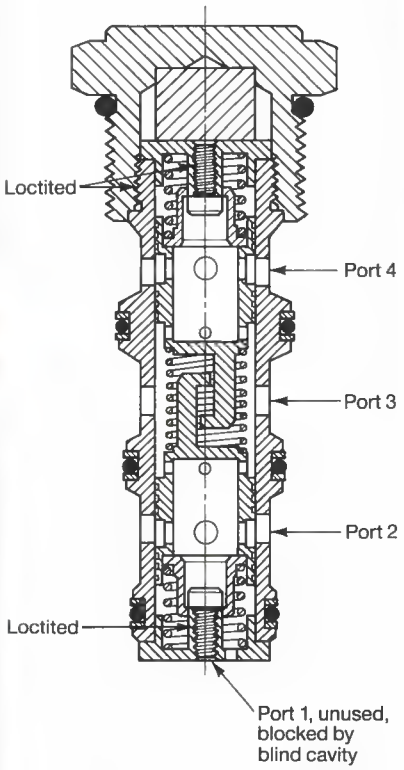
Flow divider-combiners, pressure-compensated positive traction series for vehicle transmissions

FDC3-10/16

Functional symbol



Typical section



FDC3-10
Similar construction for FDC3-16

Model and ordering code

FDC3-(V)-***-****
1 2 3 4

1 Nominal size/rated flow
10 = 45 l/min (12 US gpm)
16 = 227 l/min (60 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
FDC3-10 models
6T = With SAE 6 size ports
FDC3-16 models
12T = With SAE 12 size ports

4 Flow division, nominal

Code	Flow division %		Max. inlet flow, port 3. l/min (US gpm)	
	Port 4	Port 2	FDC3-10 models	FDC3-16 models
33	50	50	22,7 (6)	76 (20)
44	50	50	30,2 (8)	106 (28)
66	50	50	45,4 (12)	151 (40)
88	50	50	60,5 (16)	227 (60)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

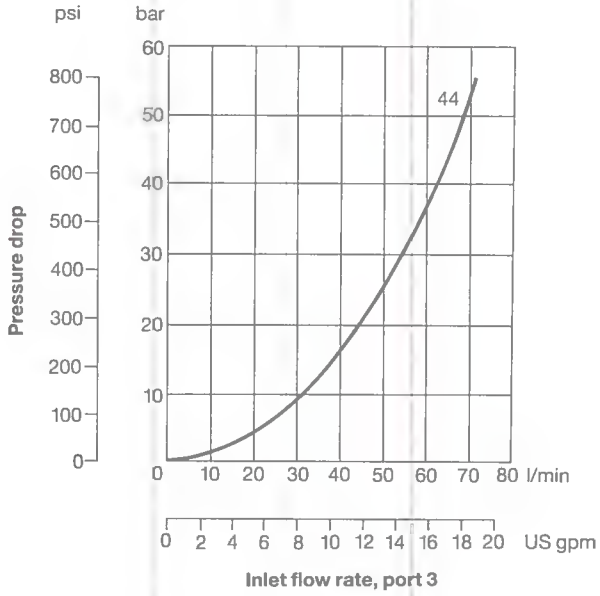
Max. pressure, all ports	207 bar (3000 psi)
Rated flow	See 1 in "Model code" above
Max. inlet flow: FDC3-10 FDC3-16	 61 l/min (16 US gpm) 227 l/min (60 US gpm)
Flow division; nominal	See 4 in "Model code" above
Pressure drop characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See two pages on
Cavity size: FDC3-10 FDC3-16	 C-10-4 C-16-4 For dimensions see page 247

Continued on next page

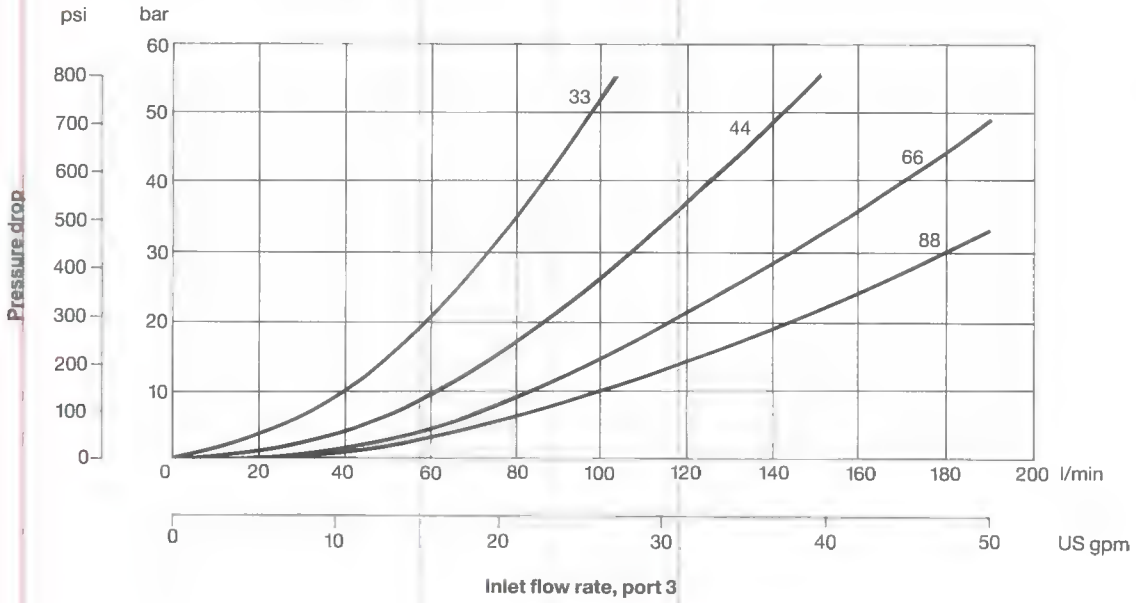
Mass, cartridge only:	
FDC3-10	0,1 kg (0.22 lb) approx.
FDC3-16	0,35 kg (0.78 lb) approx.
Housing options:	
Standard light-duty type	See page 258
Standard fatigue-rated type	Not suitable for FDC3 valves
Customized types	Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only

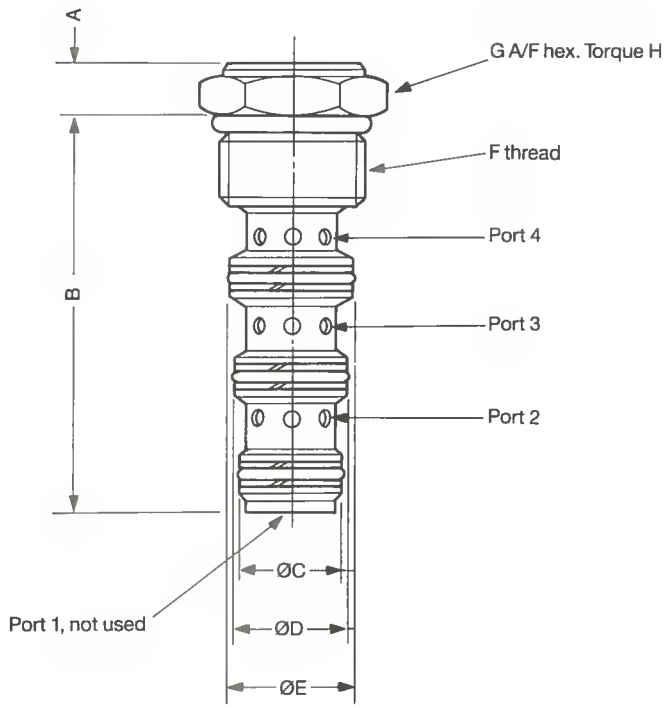
FDC3-10
Flow division code 44 example



FDC3-16
Flow division code 33, 44, 66 and 88 examples



Installation dimensions in mm (inches)



Model	A	B	ØC	ØD	ØE
FDC3-10	8 (0.31)	63,9 (2.516)	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)	18,97 (0.747) 18,92 (0.745)
FDC3-16	13 (0.51)	104,78 (4.125)	25,37 (0.999) 25,32 (0.997)	26,95 (1.061) 26,90 (1.059)	28,55 (1.124) 28,50 (1.122)

Model	F	G	H
FDC3-10	0.875″-14 UNF	25,4 (1.0)	47-54 Nm (35-40 lbf ft)
FDC3-16	1.3125″-12 UN	38,1 (1.5)	109-122 Nm (80-90 lbf ft)

Spare parts

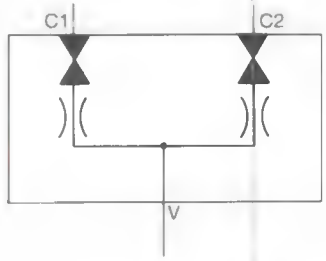
The only parts available are seal kits comprising external seals and back-up rings for:

	Kit no.
FDC3-10-*	SK2-10-4
FDC3-10V-*	SK2-10V-4
FDC3-16-*	SK2-16-4
FDC3-16V-*	SK2-16V-4

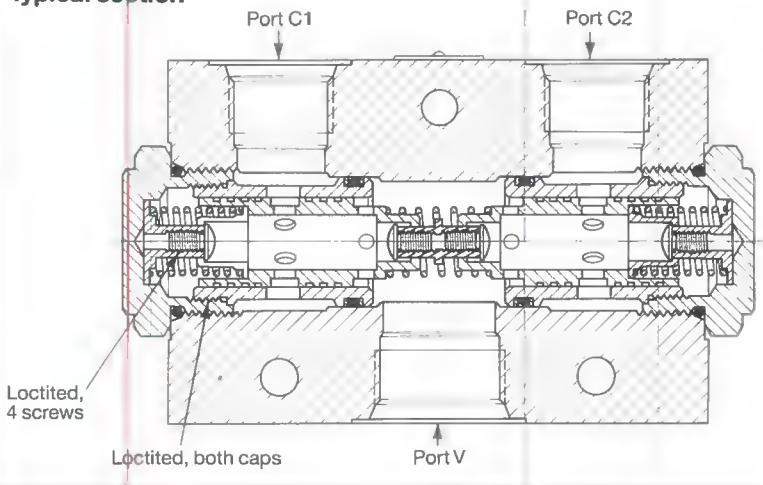
Flow divider-combiners, pressure-compensated positive traction series for vehicle transmissions

FDC3-20

Functional symbol



Typical section



Model and ordering code

FDC3-20(V)-16T-**
[1] [2]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Flow division, nominal**

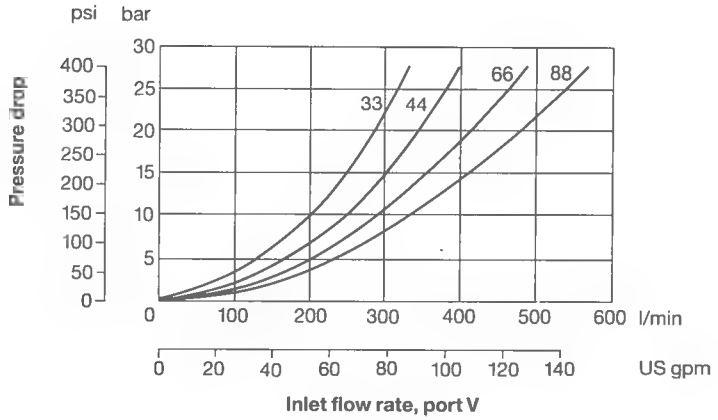
Code	Flow division % Port C1	Port C2
33	50	50
44	50	50
66	50	50
88	50	50

Code	Max. inlet flow, port V. l/min (US gpm)
33	189 (50)
44	265 (70)
66	378 (100)
88	567 (150)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

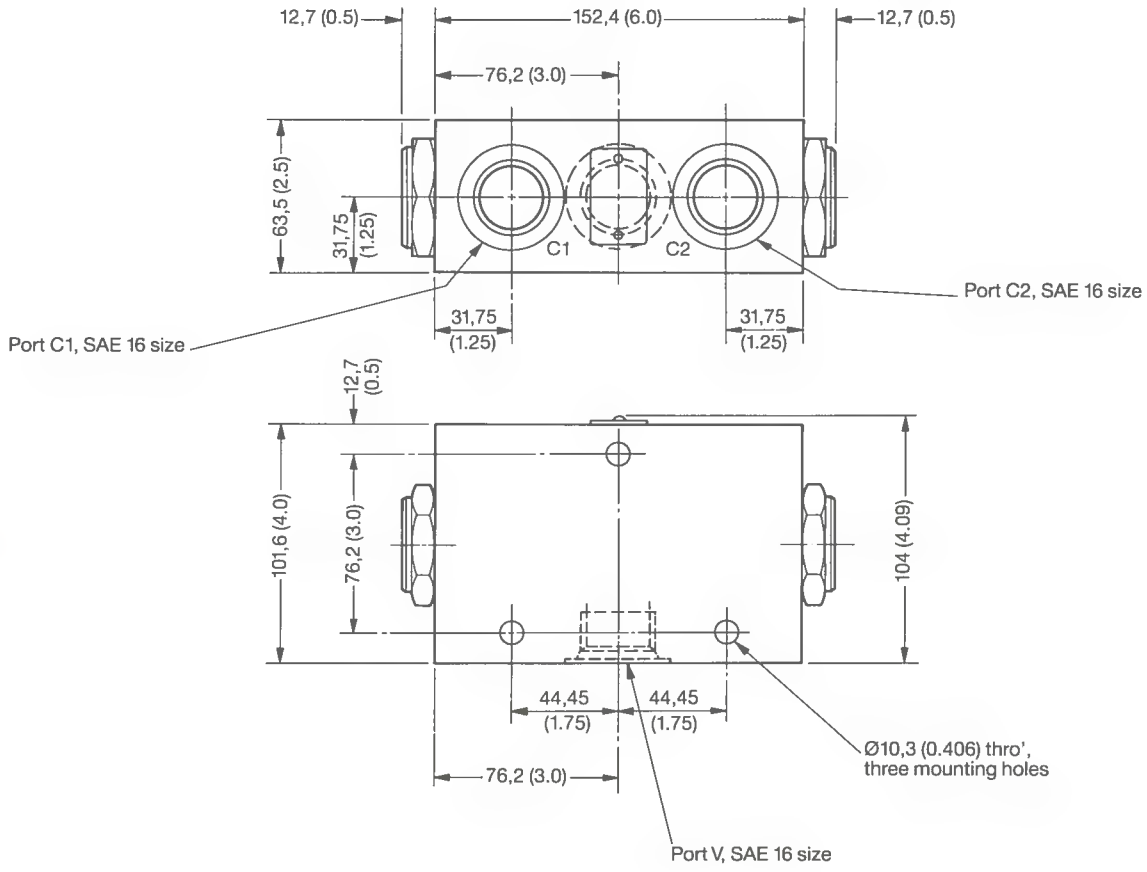
Max. pressure, all ports	207 bar (3000 psi) Light duty housing, not fatigue-rated
Rated flow	378 l/min (100 US gpm)
Max. inlet flow	568 l/min (150 US gpm)
Flow division; nominal	See [2] in "Model code" above
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions	See next page
Mass	2,6 kg (5.75 lb) approx.
Housing options: Standard light-duty type Customized types	 As shown Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Flow division code 33, 44, 66 and 88 examples



Installation dimensions in mm (inches)

3rd angle projection



Spare parts

The only parts available are seal kits (two per valve) comprising external seals and back-up rings for:	Kit no.
FDC3-20-16T	SK2-20-2
FDC3-20V-16T	SK2-20V-2

Check valves

The Vickers Modular range of direct and pilot operated check valves provides the hydraulic circuit designer with a wide selection of cartridge and in-line products.

All cartridges have hardened and ground poppets (other than CVI-10(V)-B models which utilize a ball) and sharp-edged ground steel seats providing excellent dirt-tolerant and reliable seating, suitable for fast-cycling and long life.

For all products the maximum leakage which may be expected across the seated valve is no more than 0,5 cm^3/min (0.03 in^3/min) under standard test conditions.

Direct operated check valves
A wide selection of cracking pressures is available (see the following pages) from 0,21 to 20,7 bar (3 to 300 psi). Thus the opportunity exists to use the valves not only as conventional checks but also as low pressure relief valves.

Cartridges fit into standard Vickers Modular cavities and may be supplied for customers to install in manifolds, or be provided in standard housings having SAE or G(BSPF) ports suitable for in-line mounting.

One series of size 10 valves has reverse flow paths, providing additional flexibility in manifold layout.

The RV4-10 valve incorporates a free flow check function and a reverse thermal-expansion relief valve. This valve may be installed to protect parts of circuits having trapped fluid volumes subject to temperature rises.

Pilot operated check valves
The range includes cartridges that can be supplied loose or in standard housings having SAE or G(BSPF) tapped ports. Other models are formed as standard valve packages for single or dual-line functions, and have SAE ports.

Any of the products can be customized into MCD packages for in-line mounting or for mounting directly on to actuators.

The poppet/seat arrangement is designed for positive load locking until the required pilot pressure signal is applied; formulae for calculating pilot pressures are included on the appropriate following pages.

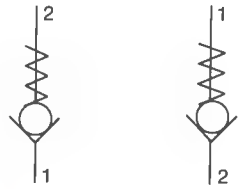
Seals on the pilot piston are an option on most models, minimizing leakage between pilot and main ports.

Check valves, direct operated series

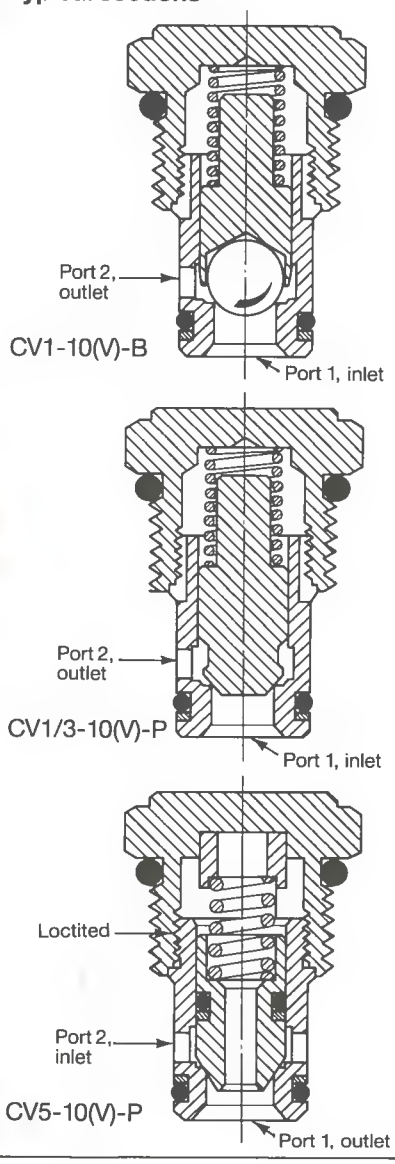
CV1/3/5-10

Functional symbols

CV1/3-10 CV5-10



Typical sections



Model and ordering code

CV*-10V- * - ** - *

1 2 3 4 5

1 Type
1, 3 or 5. See "Functional symbols" and "Typical sections", left.

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Seating type
B = Ball, CV1-10(V)-B-***-5 models only
P = Poppet, all other models

4 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

Continued in next column

5 Cracking pressure; bar (psi)
CV1-10(V)-B models
5 = 0,34 (5)

CV1-10(V)-P models
5 = 0,34 (5)
15 = 1,03 (15)
30 = 2,07 (30)
65 = 4,48 (65)
100 = 6,9 (100)
300 = 20,7 (300)

CV3-10(V)-P models
3 = 0,207 (3)
10 = 0,69 (10)
20 = 1,38 (20)
40 = 2,76 (40)
65 = 4,48 (65)
100 = 6,9 (100)
180 = 12,4 (180)
210 = 14,5 (210)

CV5-10(V)-P models
25 = 1,72 (25)
47 = 3,24 (47)

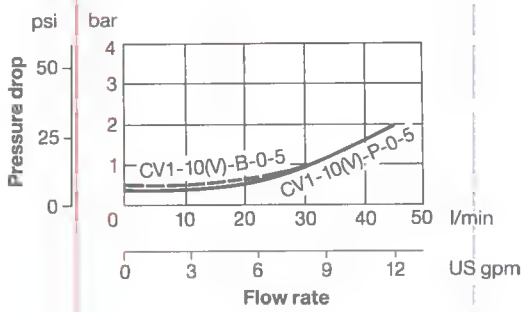
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow: CV1/5 models CV3 models	 45 l/min (12 US gpm) 76 l/min (20 US gpm)
Cracking pressure	See 5 in "Model code" above
Pressure drop characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-2 For dimensions see page 247
Mass, cartridge only	0,08 kg (0.17 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

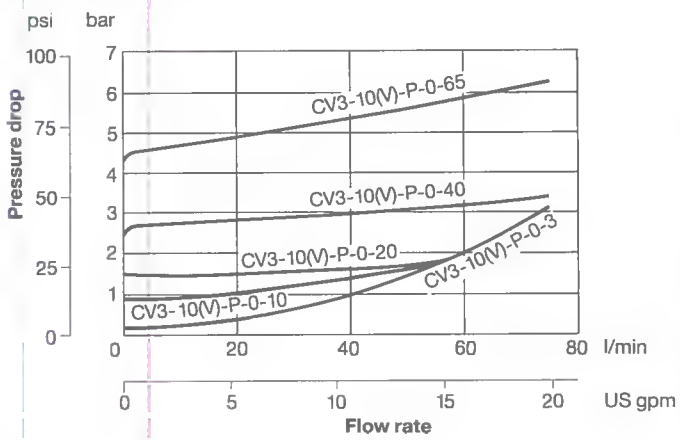
Pressure drop characteristics

Cartridges only

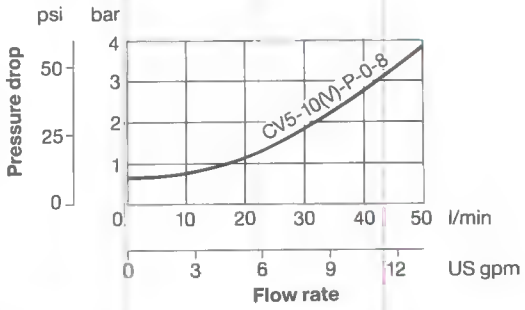
CV1-10 examples



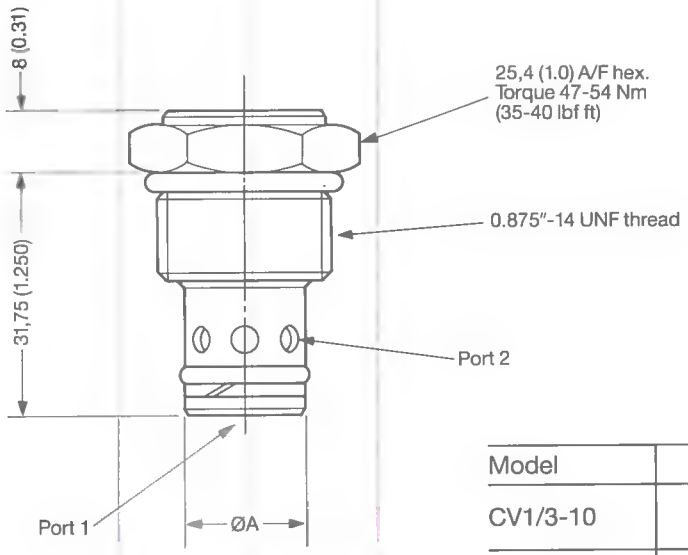
CV3-10 examples



CV5-10 example



Installation dimensions in mm (inches)



Model	ØA
CV1/3-10	15,82 (0.623) 15,77 (0.621)
CV5-10	15,82 (0.623) 15,80 (0.622)

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

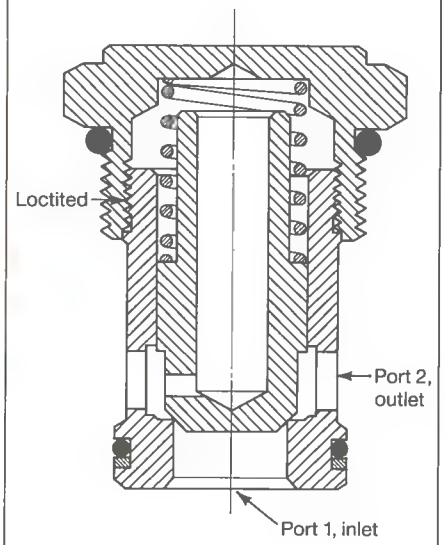
	Kit no.
CV*-10-*	SK-10-2
CV*-10V-*	SK-10V-2

Check valves, direct operated series

CV1-16

Functional symbol

Typical section



Model and ordering code

CV1-16(V)-P-*-****
[1] [2] [3]

[1] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

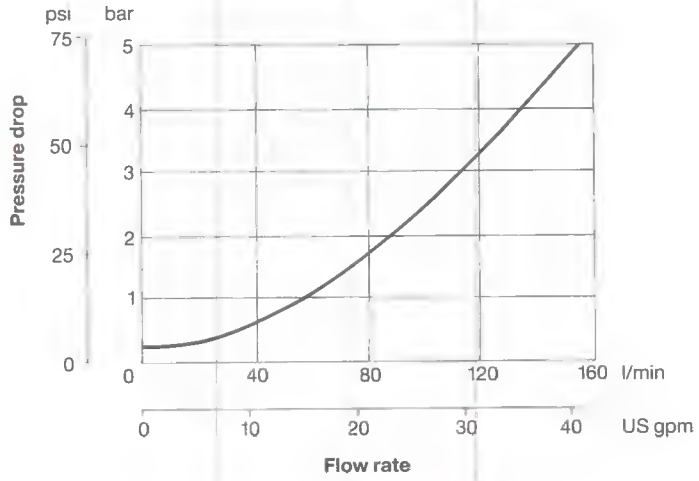
[3] Cracking pressure
5 = 0,34 bar (5 psi)
20 = 1,38 bar (20 psi)
30 = 2,07 bar (30 psi)
50 = 3,45 bar (50 psi)

Operating data

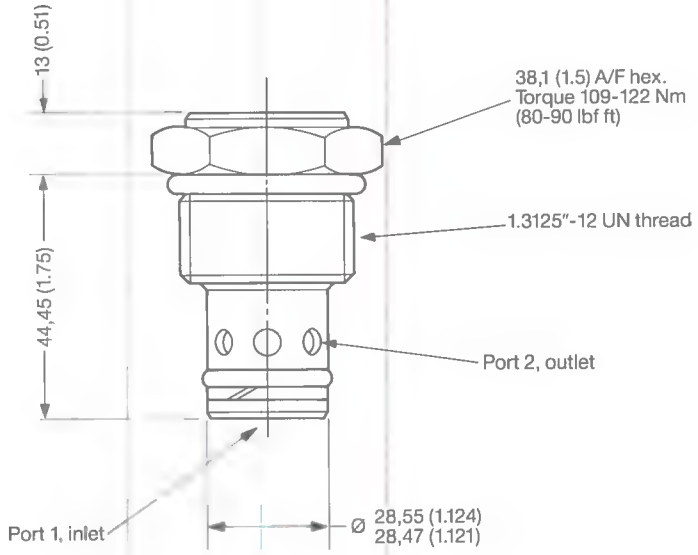
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	151 l/min (40 US gpm)
Cracking pressure	See [3] in "Model code" above
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-2 For dimensions see page 247
Mass, cartridge only	0,26 kg (0.58 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only
CV1-16(V) P-0-5 example



Installation dimensions in mm (inches)



Spare parts

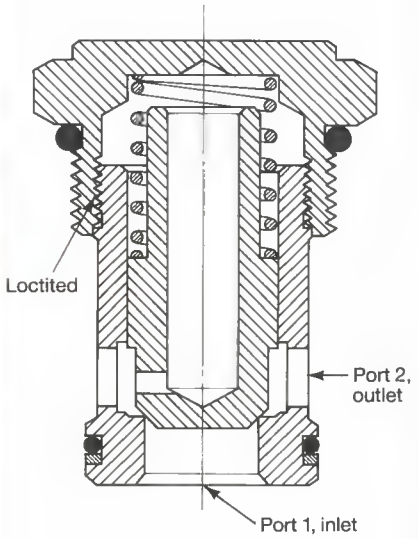
The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
CV1-16-P	SK-16-2
CV1-16V-P	SK-16V-2

Check valves, direct operated series

CV2-20

Functional symbol

Typical section



Model and ordering code

CV2-20(V)-P-*-*****
[1] [2] [3]

[1] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
16T = With SAE 16 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
12H = With SAE 12 size ports
16H = With SAE 16 size ports
6G = With G¾" (BSPF) size ports
8G = With G1" (BSPF) size ports

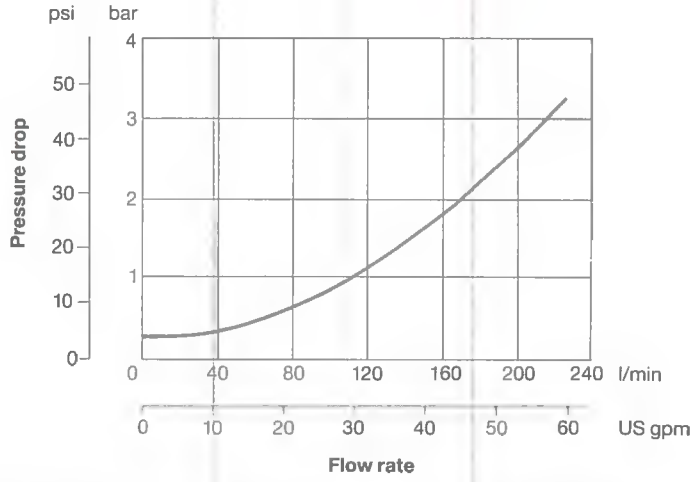
[3] Cracking pressure
5 = 0,34 bar (5 psi)
15 = 1,03 bar (15 psi)
30 = 2,07 bar (30 psi)
60 = 4,14 bar (60 psi)
100 = 6,9 bar (100 psi)

Operating data

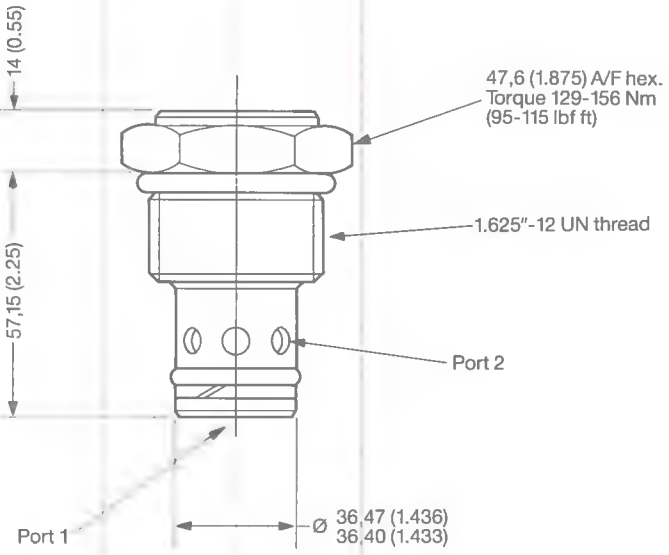
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports	207 bar (3000 psi)
Rated flow	227 l/min (60 US gpm)
Cracking pressure	See [3] in "Model code" above
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-20-2 For dimensions see page 247
Mass, cartridge only	0,49 kg (1.09 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

Pressure drop characteristics
Cartridges only
CV2-20(V)-P-0-5 example



Installation dimensions in mm (inches)



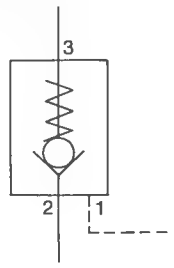
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
CV2-20-P	SK-20-2
CV2-20V-P	SK-20V-2

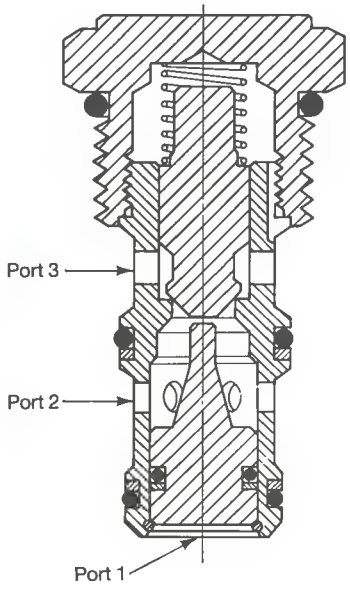
Pilot operated check valves, single-acting series

SPC2-10

Functional symbol



Typical section



Model and ordering code

SPC2-10(V)-P--*****

1 2 3

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports

Continued in next column

8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

3 Cracking pressure
25 = 1,72 bar (25 psi)
50 = 3,45 bar (50 psi)
100 = 6,9 bar (100 psi)

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

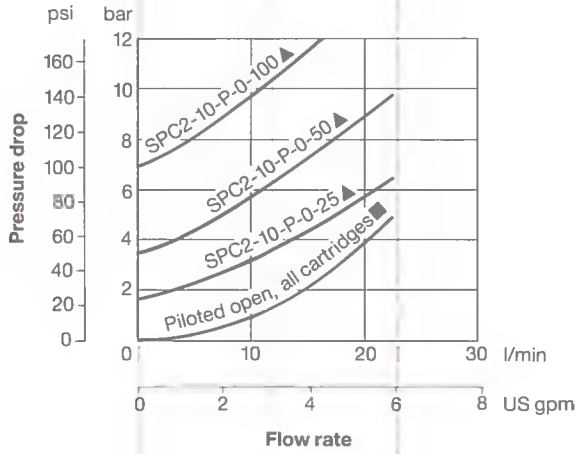
Max. pressure, all ports	207 bar (3000 psi)
Rated flow	23 l/min (6 US gpm)
Cracking pressure	See 3 in "Model code" above
Pilot pressure calculation	See formula below
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 1 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-3 For dimensions see page 247
Mass, cartridge only	0,08 kg (0.18 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 257 See page 253 Consult your local sales engineer
Spare parts	See next page

Pilot pressure calculation
Nominal pressure to open valve by remote control

Pilot pressure at port 1 =

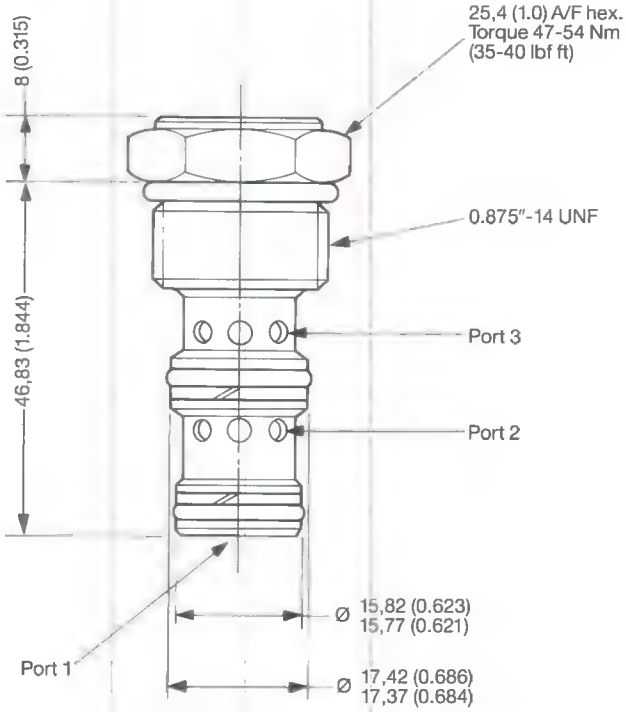
$$\frac{\text{Cracking pressure} + \text{Pressure at port 3}}{4} + (0.75 \times \text{Pressure at port 2})$$

Pressure drop characteristics
Cartridges only



▲ Port 2 to 3, zero pilot pressure at port 1
■ Port 3 to 2

Installation dimensions in mm (inches)



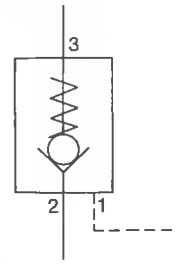
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
SPC2-10-P	SK-10-3
SPC2-10V-P	SK-10V-3

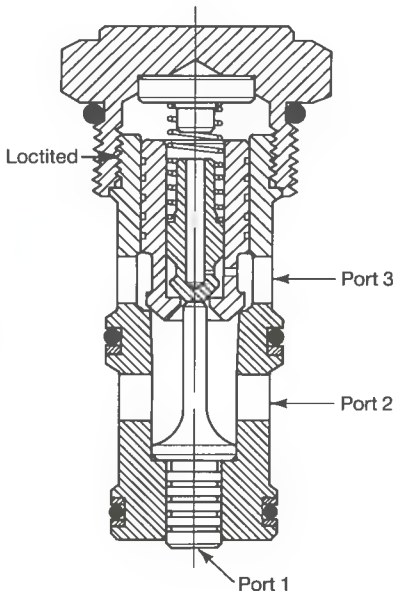
Pilot operated check valves, single-acting series

SPC2-16

Functional symbol



Typical section



Model and ordering code

SPC2-16(V)-P-***
[1] [2]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Form**
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
10H = With SAE 10 size ports

Continued in next column

12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)
Rated flow	114 l/min (30 US gpm)
Cracking pressure	0,55 bar (8 psi)
Pilot pressure calculation	See formula below
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-3 For dimensions see page 247
Mass, cartridge only	0,26 kg (0.58 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 257 See page 253 Consult your local sales engineer
Spare parts	See next page

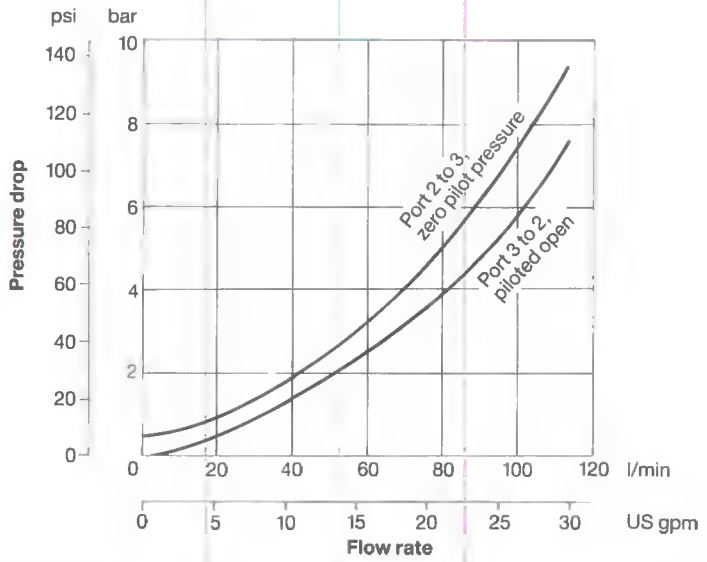
Pilot pressure calculation
Nominal pressure to open valve by remote control

Pilot pressure at port 1 =

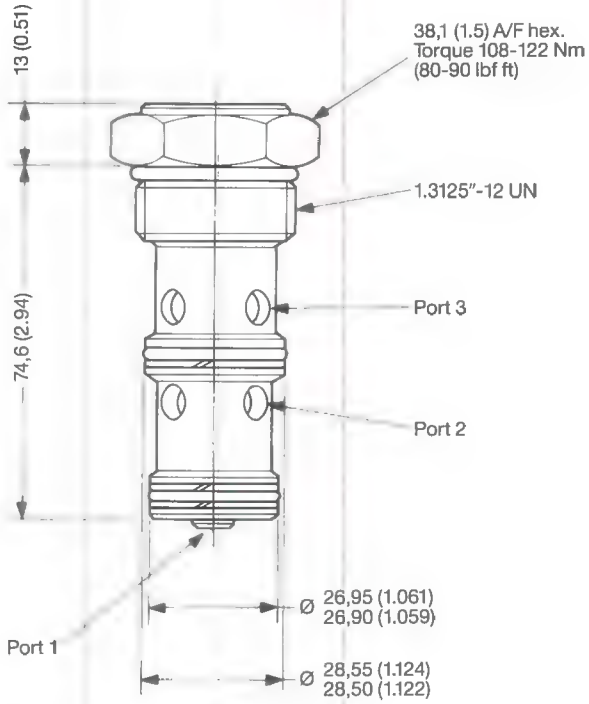
$$\frac{\text{Cracking pressure} + \text{Pressure at port 3}}{4} + (0.75 \times \text{Pressure at port 2})$$

Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)



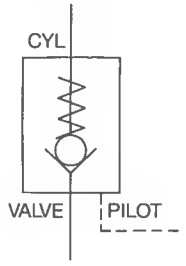
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
SPC2-16-P	SK3-16-3
SPC2-16V-P	SK3-16V-3

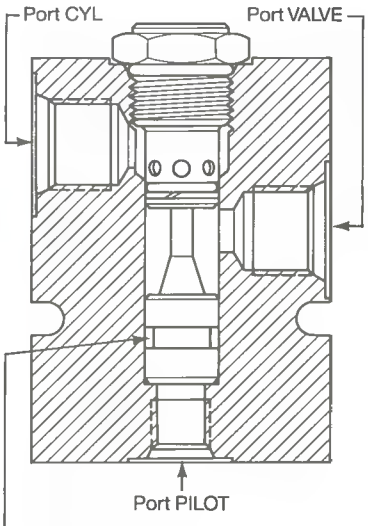
Pilot operated check valves, single-acting series

SPC1-10

Functional symbol



Typical section



Pilot piston, shown without optional seal and back-up rings in groove. For details see page 264.

Model and ordering code

SPC1-10(S)(V)-P-**
1 2 3

1 Pilot piston seal
Blank = No seal
S = With seal

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size main ports and SAE 4 size pilot port
8T = With SAE 8 size main ports and SAE 4 size pilot port

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

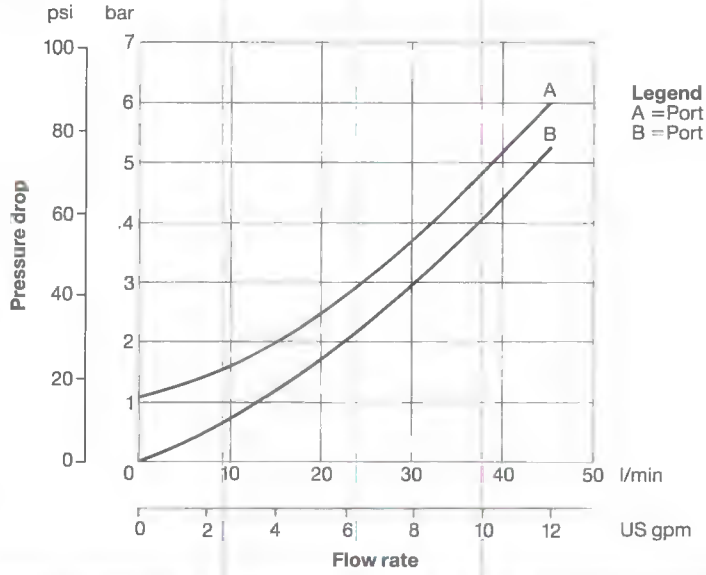
Max. pressure, all ports	207 bar (3000 psi). See 3 in "Model code" above
Rated flow	45 l/min (12 US gpm)
Cracking pressure	1,03 bar (15 psi)
Pilot pressure calculation	See formula below
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions	See next page
Mass	0,52 kg (1.14 lb) approx.
Spare parts	See next page

Pilot pressure calculation
Nominal pressure to open valve by remote control

Pilot pressure at port PILOT =

$$\frac{\text{Cracking pressure} + \text{Pressure at port CYL}}{4} + (0.75 \times \text{Pressure at port VALVE})$$

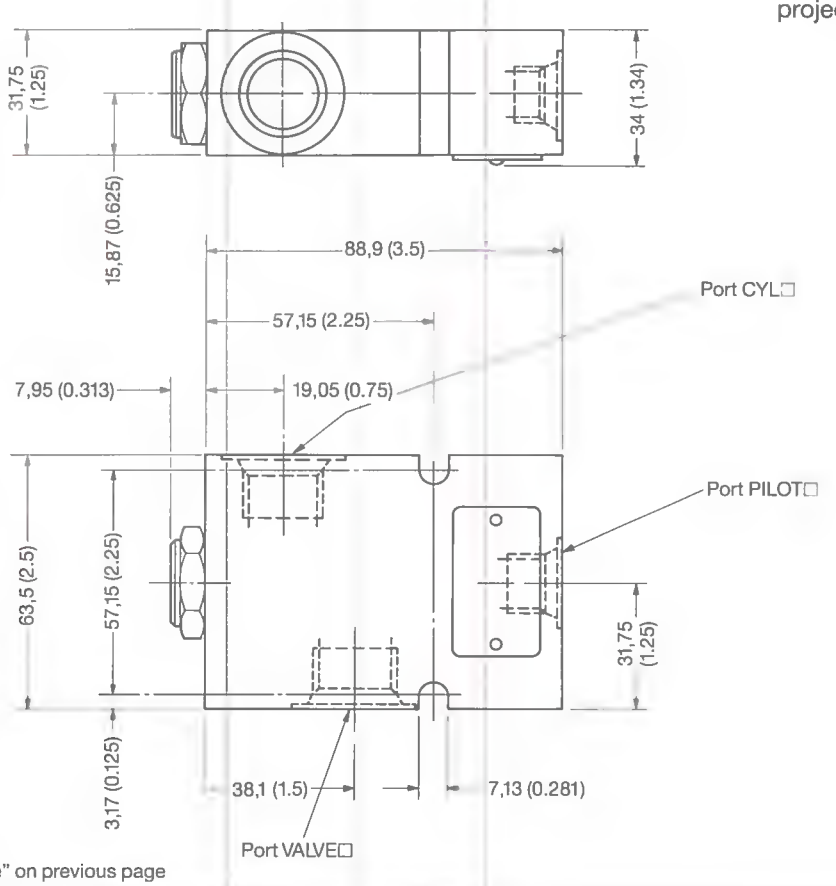
Pressure drop characteristics



Legend
A = Port VALVE to CYL, zero pilot pressure
B = Port CYL to VALVE, piloted open

Installation dimensions in mm (inches)

3rd angle projection



□ For sizes see [3] in "Model code" on previous page

Spare parts

The only parts available are cartridges and seal kits comprising external seals and back-up rings

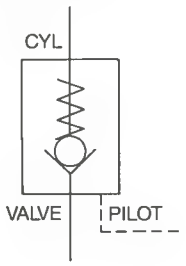
For model	Cartridge▲	Seal kit(s) for: Cartridge■	Pilot piston◪
SPC1-10-P	CV1-10-P-0-15	SK-10-2	—
SPC1-10V-P	CV1-10V-P-0-15	SK-10V-2	—
SPC1-10S-P	CV1-10-P-0-15	SK-10-2	SK3-014
SPC1-10SV-P	CV1-10V-P-0-15	SK-10V-2	SK3-014V

▲ One per SPC1 valve. See page 171. ■ One per cartridge ◪ One per SPC1 valve

Pilot operated check valves, single-acting series

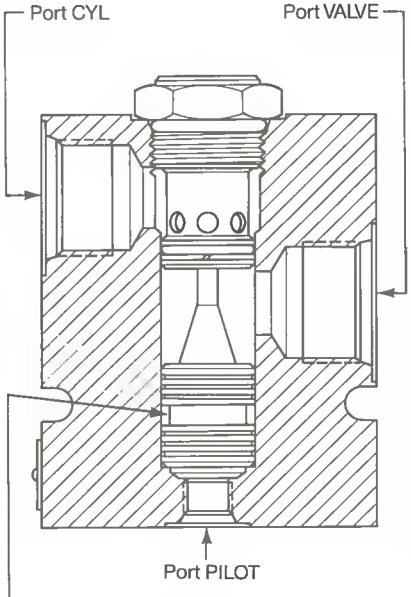
SPC1-16

Functional symbol



Typical section

Free flow



Pilot piston, shown without optional seal and back-up rings in groove. For details see page 264.

Model and ordering code

SPC1-16(S)(V)-P-**
1 2 3

1 Pilot piston seal
Blank = No seal
S = With seal

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
In light-duty housing;
207 bar (3000 psi) max.
12T = SAE 12 size main ports and SAE 6 size pilot port

Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi). See 3 in "Model code" above
Rated flow	151 l/min (40 US gpm)
Cracking pressure	1,38 bar (20 psi)
Pilot pressure calculation	See formula below
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions	See next page
Mass	1,83 kg (4.03 lb) approx.
Spare parts	See next page

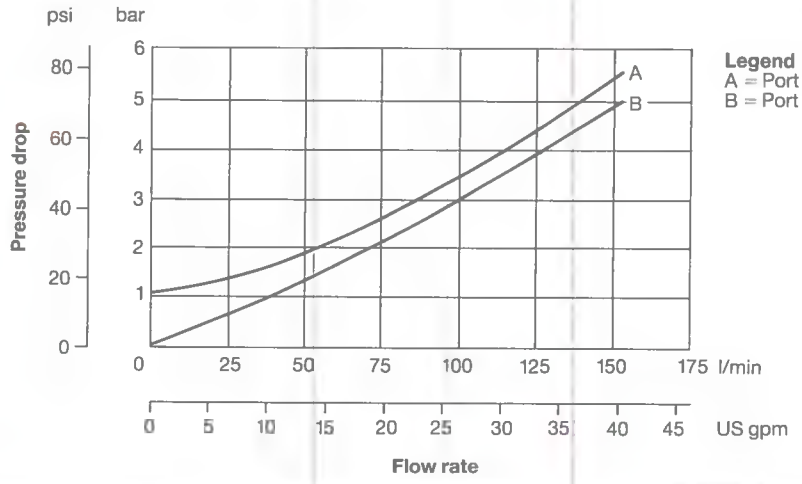
Pilot pressure calculation

Nominal pressure to open valve by remote control

Pilot pressure at port PILOT =

$$\frac{\text{Cracking pressure} + \text{Pressure at port CYL}}{4} + (0.75 \times \text{Pressure at port VALVE})$$

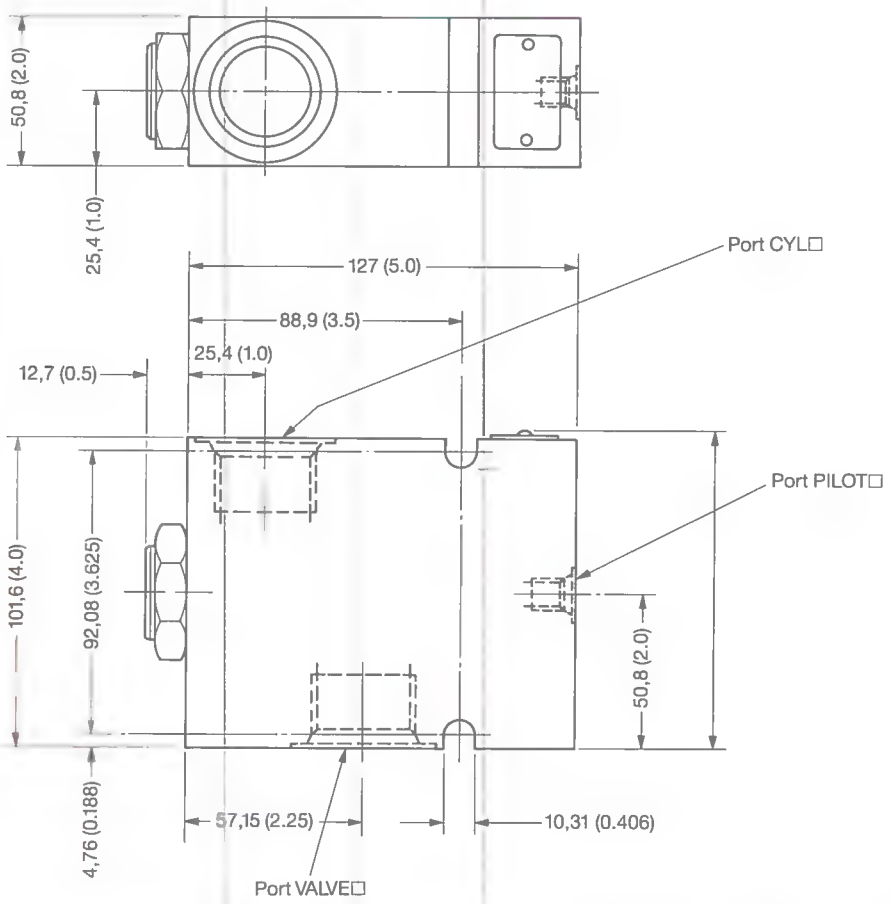
Pressure drop characteristics



Legend
A = Port VALVE to CYL, zero pilot pressure
B = Port CYL to VALVE, piloted open

Installation dimensions in mm (inches)

3rd angle projection



□ For sizes see 3 in "Model code" on previous page

Spare parts

The only parts available are cartridges and seal kits comprising external seals and back-up rings

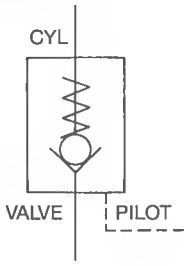
For model	Cartridge▲	Seal kit(s) for: Cartridge■	Pilot piston◪
SPC1-16-P	CV1-16-P-0-20	SK-16-2	—
SPC1-16V-P	CV1-16V-P-0-20	SK-16V-2	—
SPC1-16S-P	CV1-16-P-0-20	SK-16-2	SK3-119
SPC1-16SV-P	CV1-16V-P-0-20	SK-16V-2	SK3-119V

▲ One per SPC1 valve. See page 173. ■ One per cartridge ◪ One per SPC1 valve

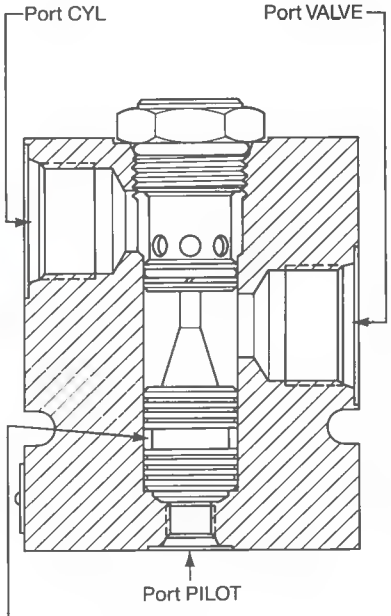
Pilot operated check valves, single-acting series

SPC1-20

Functional symbol



Typical section



Pilot piston, shown without optional seal and back-up rings in groove. For details see page 264.

Model and ordering code

SPC1-20(S)(V)-P-**
1 2 3

1 **Pilot piston seal**
Blank = No seal
S = With seal

2 **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 **Form**
In light-duty housing;
207 bar (3000 psi) max.
16T = SAE 16 size main ports and SAE 6 size pilot port
20T = SAE 20 size main ports and SAE 6 size pilot port

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

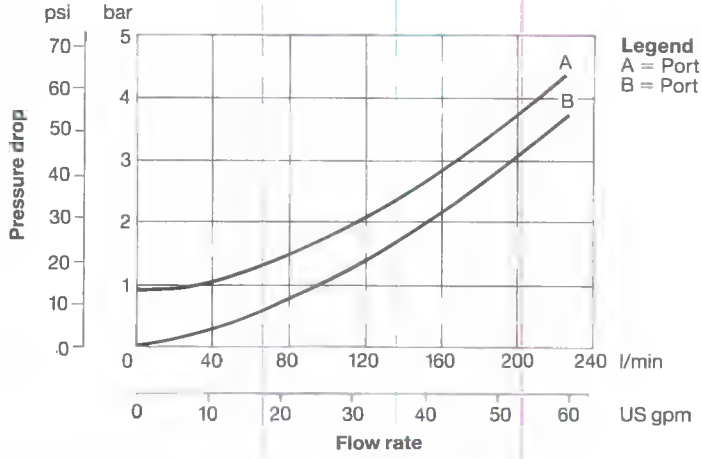
Max. pressure, all ports	207 bar (3000 psi). See 3 in "Model code" above
Rated flow	227 l/min (60 US gpm)
Cracking pressure	1,03 bar (15 psi)
Pilot pressure calculation	See formula below
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions	See next page
Mass	3,17 kg (6.98 lb) approx.
Spare parts	See next page

Pilot pressure calculation
Nominal pressure to open valve by remote control

Pilot pressure at port PILOT =

$$\frac{\text{Cracking pressure} + \text{Pressure at port CYL}}{4} + (0.75 \times \text{Pressure at port VALVE})$$

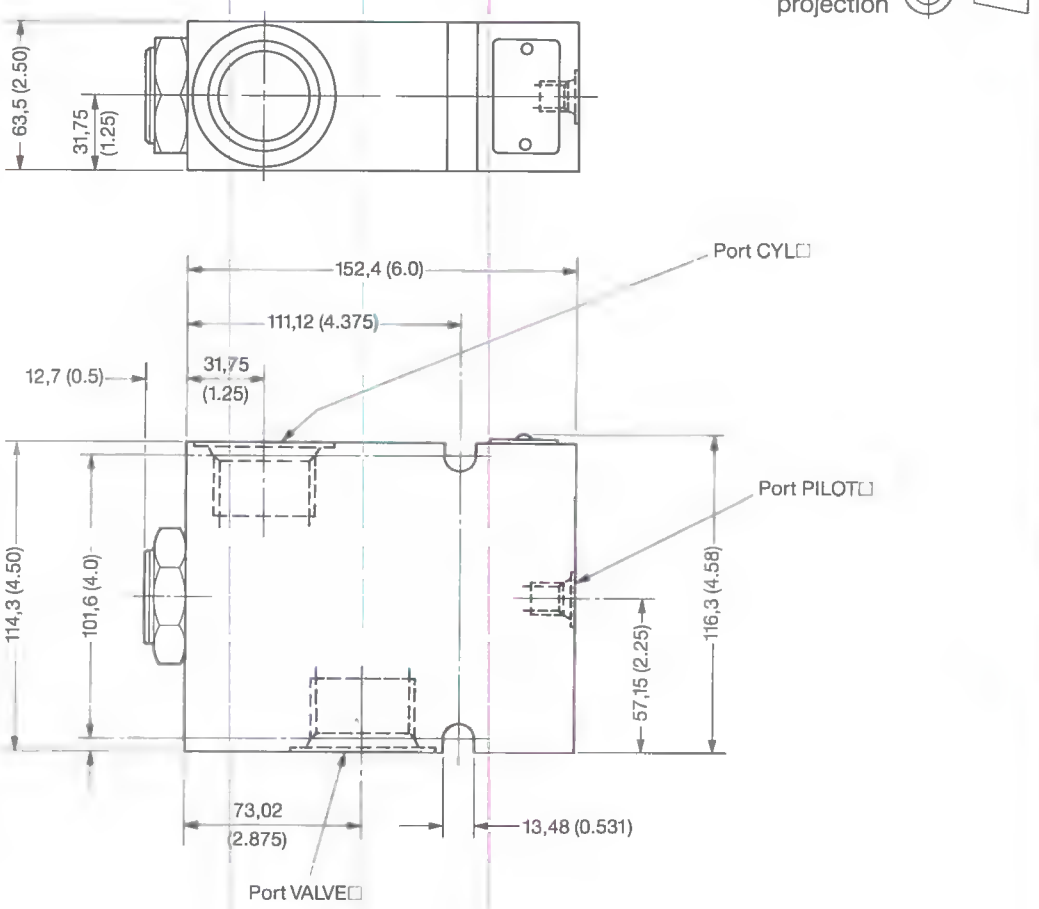
Pressure drop characteristics



Legend
A = Port VALVE to CYL, zero pilot pressure
B = Port CYL to VALVE, piloted open

Installation dimensions in mm (inches)

3rd angle projection



□ For sizes see [3] in "Model code" on previous page

Spare parts

The only parts available are cartridges and seal kits comprising external seals and back-up rings

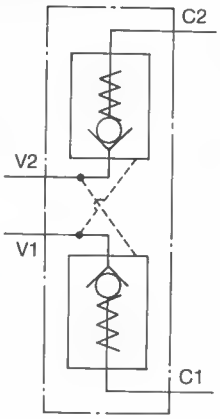
For model	Cartridge▲	Seal kit(s) for: Cartridge■	Pilot piston◪
SPC1-20-P	CV2-20-P-0-15	SK-20-2	—
SPC1-20V-P	CV2-20V-P-0-15	SK-20V-2	—
SPC1-20S-P	CV2-20-P-0-15	SK-20-2	SK3-124
SPC1-20SV-P	CV2-20V-P-0-15	SK-20V-2	SK3-124V

▲ One per SPC1 valve. See page 175. ■ One per cartridge ◪ One per SPC1 valve

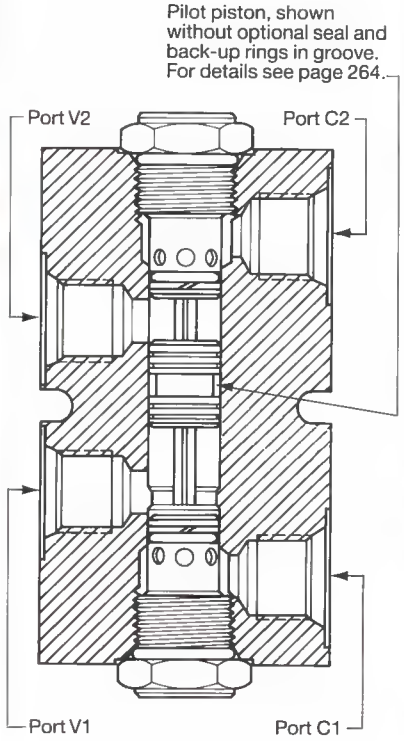
Pilot operated check valves, double-acting series

DPC1-10

Functional symbol



Typical section



Model and ordering code

DPC1-10(S)(V)-P-**
[1] [2] [3]

[1] **Pilot piston seal**
Blank = No seal
S = With seal

[2] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[3] **Form**
In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports
8T = With SAE 8 size ports

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi). See [3] in "Model code" above
Rated flow	45 l/min (12 US gpm)
Cracking pressures	1,03 bar (15 psi)
Pilot pressure calculation	See formulae below
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" above, and also page 266
Installation dimensions	See next page
Mass	0,7 kg (1.54 lb) approx.
Spare parts	See next page

Pilot pressure calculations
Nominal pilot pressures to open valves

1. Pilot pressure at V1 for flow from C2 to V2 =

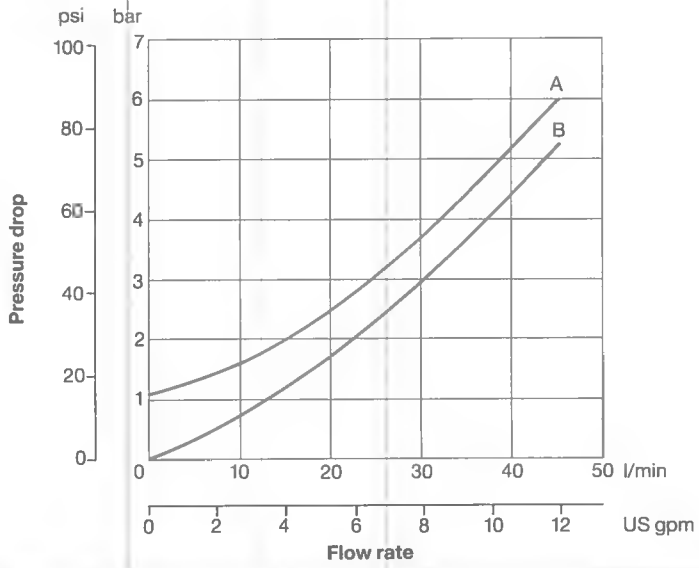
$$\frac{\text{Cracking pressure} + \text{Pressure at C2}}{4} + (0.75 \times \text{Pressure at V2})$$

2. Pilot pressure at V2 for flow from C1 to V1 =

$$\frac{\text{Cracking pressure} + \text{Pressure at C1}}{4} + (0.75 \times \text{Pressure at V1})$$

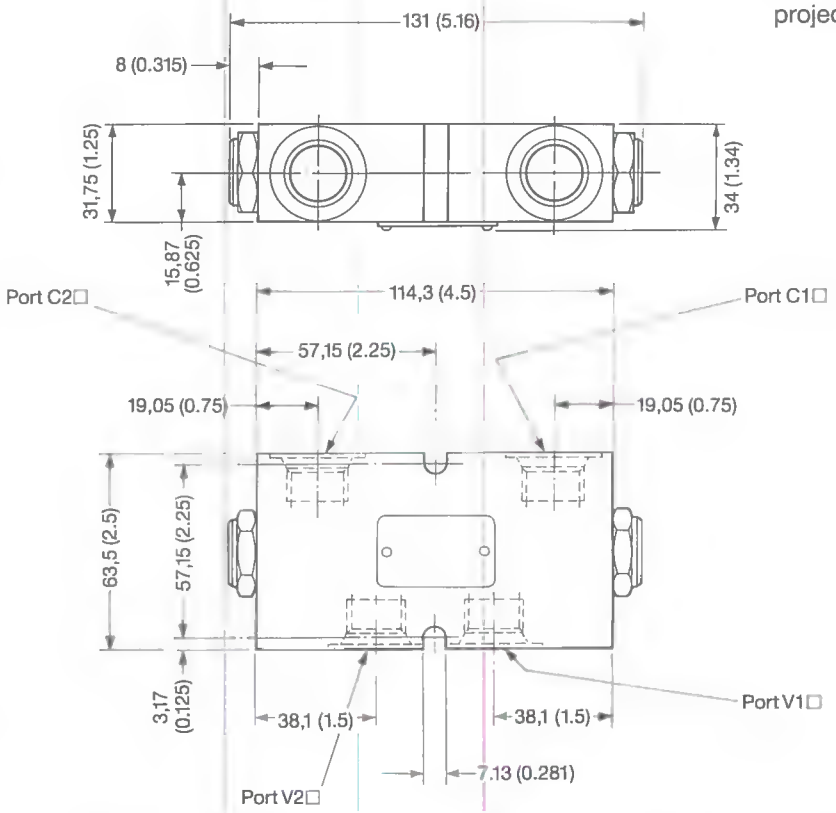
Pressure drop characteristics

Legend
A = Port V1 to C1 with zero pressure in V2, or V2 to C2 with zero pressure in V1
B = Port C1 to V1 with pilot pressure in V2, or C2 to V2 with pilot pressure in V1



Installation dimensions in mm (inches)

3rd angle projection



□ For sizes see [3] in "Model code" on previous page

Spare parts

The only parts available are cartridges and seal kits comprising external seals and back-up rings

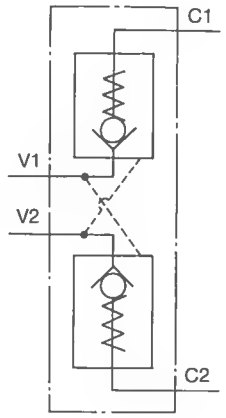
For model	Cartridges▲	Seal kit(s) for: Cartridges■	Pilot piston◪
DPC1-10-P	CV1-10-P-0-15	SK-10-2	—
DPC1-10V-P	CV1-10V-P-0-15	SK-10V-2	—
DPC1-10S-P	CV1-10-P-0-15	SK-10-2	SK3-014
DPC1-10SV-P	CV1-10V-P-0-15	SK-10V-2	SK3-014V

▲ Two per DPC1 valve. See page 171.
■ One per cartridge
◪ One per DPC1 valve

Pilot operating check valves, double-acting series

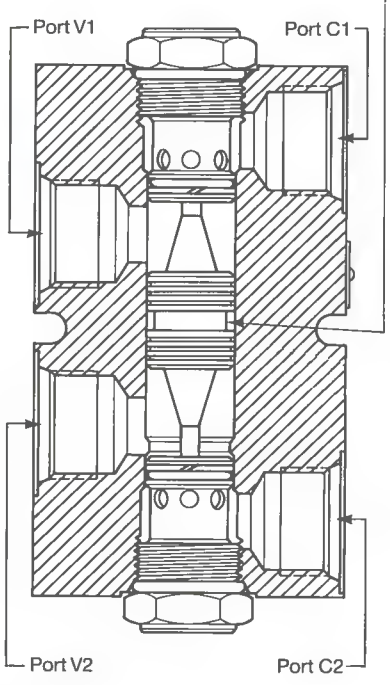
DPC1-16

Functional symbol



Typical section

Pilot piston, shown without optional seal and back-up rings in groove. For details see page 264.



Model and ordering code

DPC1-16(S)(V)-P-**
1 2 3

1 Pilot piston seal
Blank = No seal
S = With seal

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
In light-duty housing;
207 bar (3000 psi) max.
12T = With SAE 12 size ports
16T = With SAE 16 size ports

Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi). See 3 in "Model code" above
Rated flow	151 l/min (40 US gpm)
Cracking pressures	1,38 bar (20 psi)
Pilot pressure calculation	See formulae below
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions	See next page
Mass	2,61 kg (5.75 lb) approx.
Spare parts	See next page

Pilot pressure calculations

Nominal pilot pressures to open valves

1. Pilot pressure at V1 for flow from C2 to V2 =

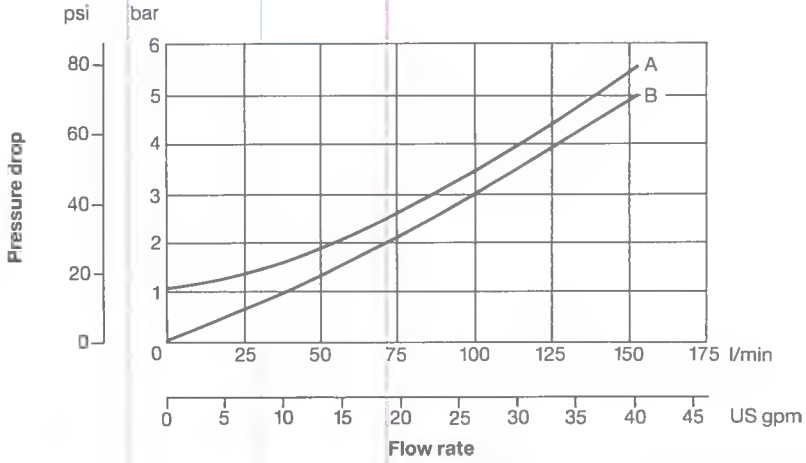
$$\frac{\text{Cracking pressure} + \text{Pressure at C2}}{4} + (0.75 \times \text{Pressure at V2})$$

2. Pilot pressure at V2 for flow from C1 to V1 =

$$\frac{\text{Cracking pressure} + \text{Pressure at C1}}{4} + (0.75 \times \text{Pressure at V1})$$

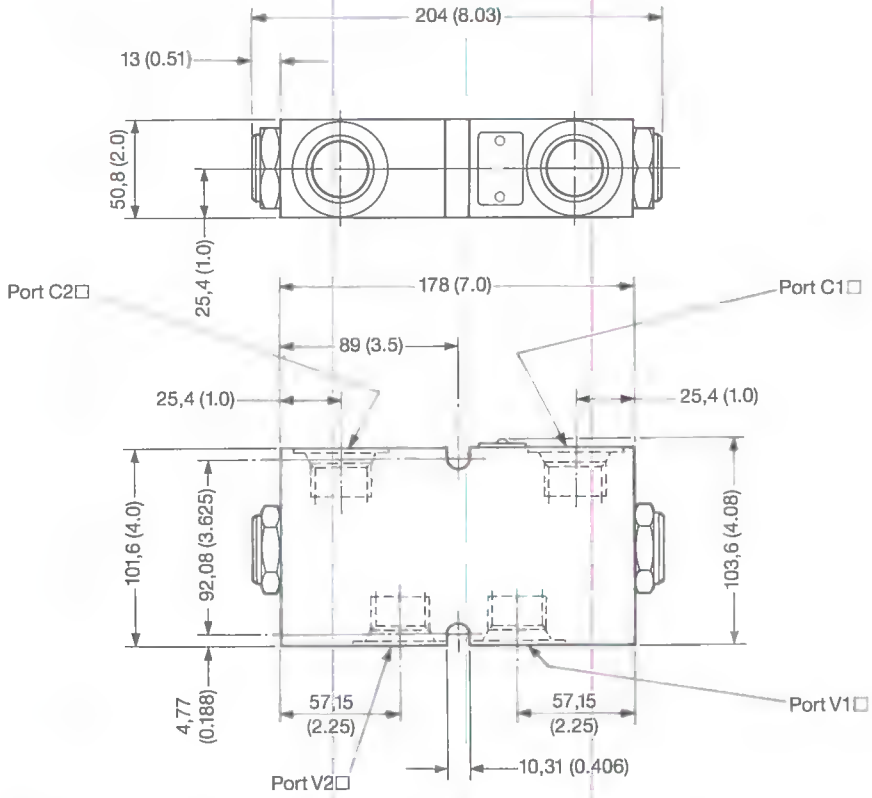
Pressure drop characteristics

Legend
A = Port V1 to C1 with zero pressure in V2, or V2 to C2 with zero pressure in V1
B = Port C1 to V1 with pilot pressure in V2, or C2 to V2 with pilot pressure in V1



Installation dimensions in mm (inches)

3rd angle projection



□ For sizes see 3 in "Model code" on previous page

Spare parts

The only parts available are cartridges and seal kits comprising external seals and back-up rings

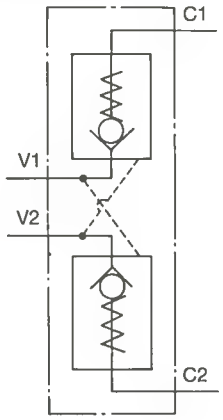
For model	Cartridges▲	Seal kit(s) for: Cartridges■	Pilot piston◪
DPC1-16-P	CV1-16-P-0-20	SK-16-2	—
DPC1-16V-P	CV1-16V-P-0-20	SK-16V-2	—
DPC1-16S-P	CV1-16-P-0-20	SK-16-2	SK3-119
DPC1-16SV-P	CV1-16V-P-0-20	SK-16V-2	SK3-119V

▲ Two per DPC1 valve. See page 173.
■ One per cartridge
◪ One per DPC1 valve

Pilot operated check valves, double-acting series

DPC1-20

Functional symbol



Model and ordering code

DPC1-20(S)(V)-P-**
1 2 3

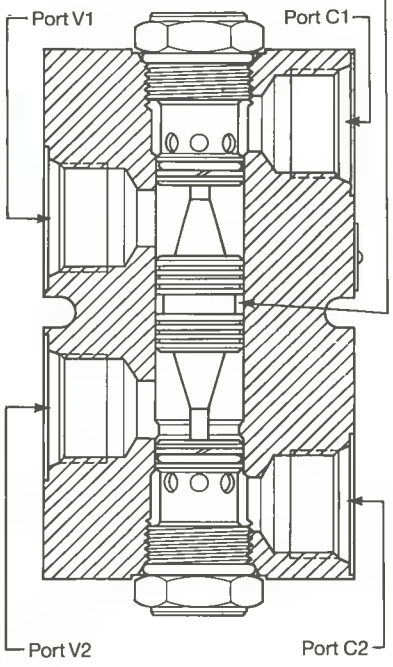
1 Pilot piston seal
Blank = No seal
S = With seal

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
In light-duty housing;
207 bar (3000 psi) max.
20T = With SAE 20 size ports

Typical section

Pilot piston, shown without optional seal and back-up rings in groove. For details see page 264.



Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi). See 3 in "Model code" above
Rated flow	227 l/min (60 US gpm)
Cracking pressures	1,03 bar (15 psi)
Pilot pressure calculation	See formulae below
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions	See next page
Mass	4,45 kg (9.8 lb) approx.
Spare parts	See next page

Pilot pressure calculations

Nominal pilot pressures to open valves

1. Pilot pressure at V1 for flow from C2 to V2 =

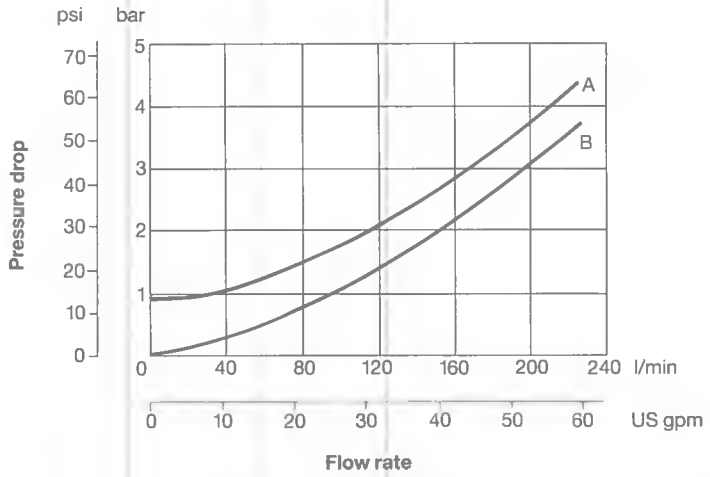
$$\frac{\text{Cracking pressure} + \text{Pressure at C2}}{4} + (0.75 \times \text{Pressure at V2})$$

2. Pilot pressure at V2 for flow from C1 to V1 =

$$\frac{\text{Cracking pressure} + \text{Pressure at C1}}{4} + (0.75 \times \text{Pressure at V1})$$

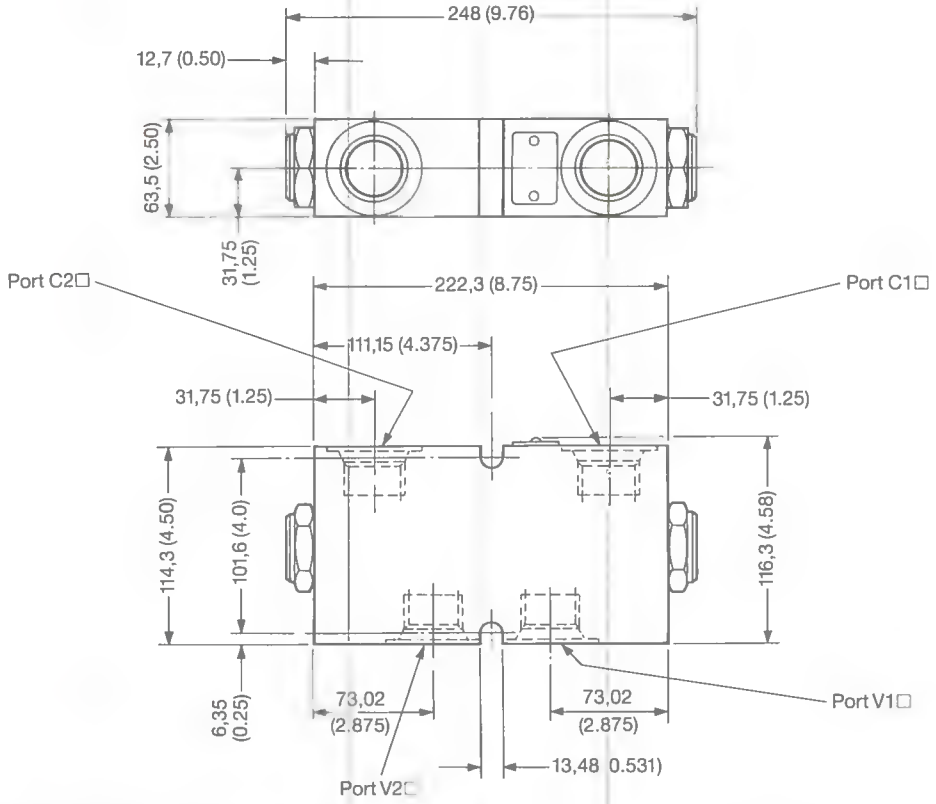
Pressure drop characteristics

Legend
A = Port V1 to C1 with zero pressure in V2, or V2 to C2 with zero pressure in V1
B = Port C1 to V1 with pilot pressure in V2, or C2 to V2 with pilot pressure in V1



Installation dimensions in mm (inches)

3rd angle projection



□ For sizes see 3 in "Model code" on previous page

Spare parts

The only parts available are cartridges and seal kits comprising external seals and back-up rings

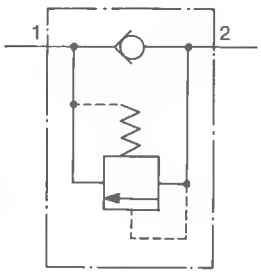
For model	Cartridges ▲	Seal kit(s) for: Cartridges ■	Pilot piston ◪
DPC1-20-P	CV2-20-P-0-15	SK-20-2	—
DPC1-20V-P	CV2-20V-P-0-15	SK-20V-2	—
DPC1-20S-P	CV2-20-P-0-15	SK-20-2	SK3-124
DPC1-20SV-P	CV2-20V-P-0-15	SK-20V-2	SK3-124V

▲ Two per DPC1 valve. See page 175.
■ One per cartridge
◪ One per DPC1 valve

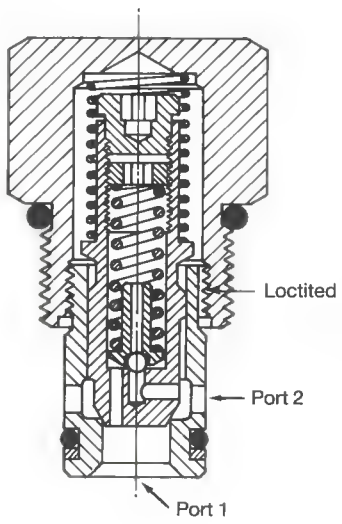
Check valves with thermal expansion relief function

RV4-10

Functional symbol



Typical section



Model and ordering code

RV4-10(V)-F--50/****
[1] [2] [3]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Form**
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

[3] **Thermal expansion relief factory-setting**
Cracking pressures between 27,6-206 bar (400-3000 psi). Consult your local sales engineer if higher pressures are required.

User-requested settings in 6,9 bar (100 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
11 = 75,9 bar (1100 psi)
Insert required code when ordering.

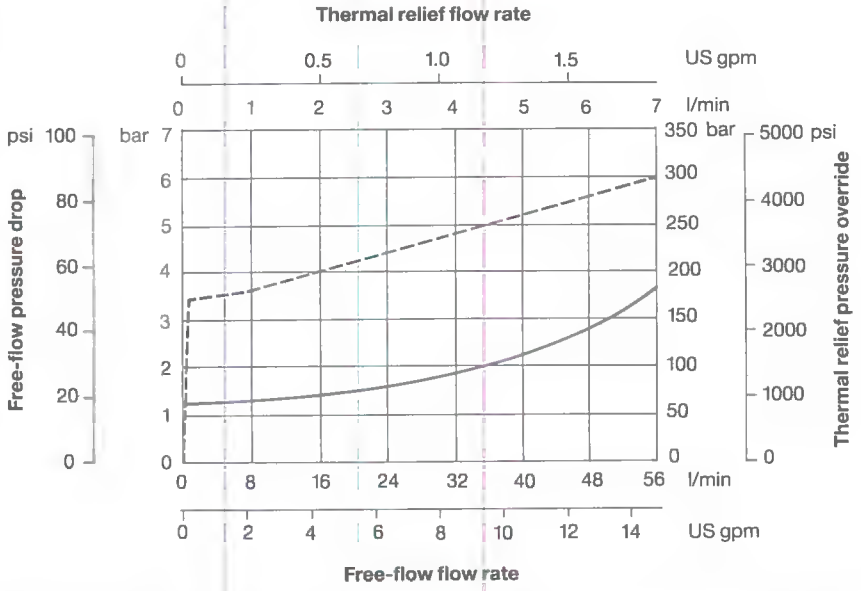
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, both ports, cartridge only	207 bar (3000 psi) See [3] in "Model code" above
Rated flow	45 l/min (12 US gpm)
Thermal expansion relief factory-set cracking pressure	See [3] in "Model code" above
Free-flow direction cracking pressure	1,24 bar (18 psi)
Pressure override and free-flow characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-2 For dimensions see page 247
Mass, cartridge only	0,11 kg (0.25 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See next page

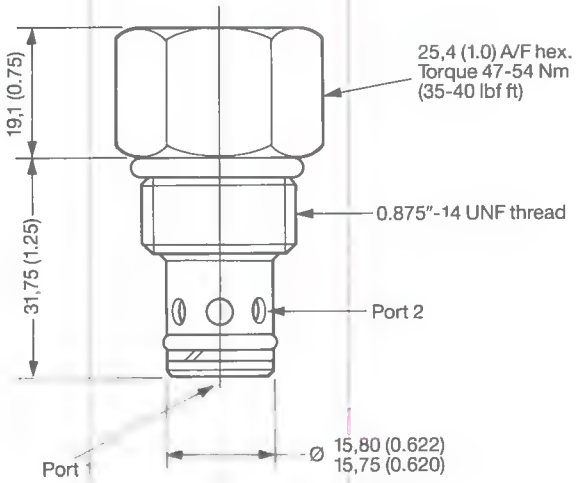
Pressure override and free-flow characteristics

Cartridges only

– – – Thermal relief flow, port 2 to 1
—— Reverse free-flow, port 1 to 2



Installation dimensions in mm (inches)



Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
RV4-10-F	SK-10-2
RV4-10V-F	SK-10V-2

Proportional controls

Vickers Modular proportional pressure and flow control valves are designed to be easily controlled by the simplest of DC electrical devices such as a 12 volt battery and a potentiometer.

However, the valves may also be simply controlled directly (in most cases) by even the most sophisticated of control circuits, such as the "analog out" of a computer control system. In many cases, because of the coil's low current draw, the valve can be operated accurately and directly without intermediate power supplies. Current draw at the coil can be less than 1 amp when a 12 volt rated coil is used, or less than 0.5 amp when a 24 volt rated coil is used.

Varying the voltage at the coil is one of the simplest means of control available. Any of the Vickers Modular DC coils will work on one of the following proportional valves by simply varying the voltage between 0 and 75% of the rated coil voltage. It should be noted that as the operating temperature of a coil increases, the solenoid force decreases. Therefore, if the voltage is held constant as the coil heats up then valve pressure (or flow) will decrease. Electrical current controls significantly overcome this problem, but not totally. Closed-loop electrical control with feedback from the parameter to be monitored will provide the most accurate control.

Proportional pressure controls
These valves will vary the effective pressure setting in response to the voltage supplied to the coil; see performance graphs on the following pages.

ERV1 valves are available in two sizes to handle flows of up to 132 l/min (35 US gpm) and 207 bar (3000 psi).

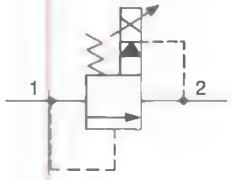
ERV2 valves are produced for controlling pilot flow rates up to 2,8 l/min (0.75 US gpm) and 35 bar (500 psi). They are ideal for use with Vickers Modular MOS1 modulating orifice cartridges, to provide for pressure compensated proportional flow, and are also incorporated into the EFPR1 models providing proportional priority flow control, with bypass, for controlled flows up to 132 l/min (35 USgpm)

Proportional flow controls
EFPR1 valves will vary the effective orifice setting in response to voltage applied to the coil. When the priority circuit is receiving the required pressure-compensated flow rate, any excess flow is bypassed to a secondary circuit or tank, depending on the application.

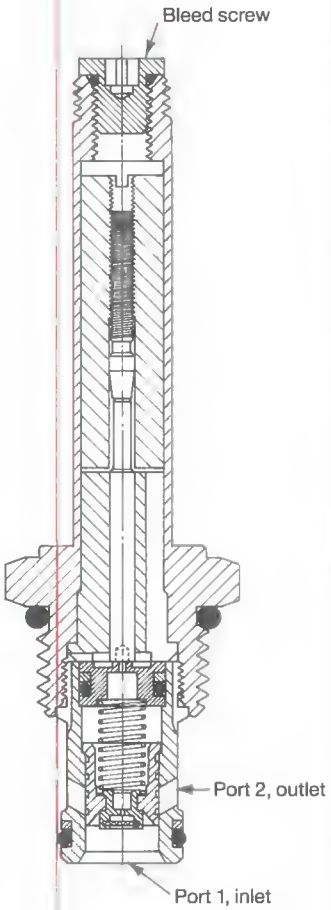
Proportional relief valves, two-stage series

ERV1-10/16

Functional symbol



Typical section
Solenoid omitted



ERV1-10
Similar construction for ERV1-16

Model and ordering code

ERV1-(V)-**-**-******
1 2 3 4 5 6

1 Nominal size/max. flow range
10 = 3,8-57 l/min (1-15 US gpm)
16 = 7,6-132 l/min (2-35 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Factory-set maximum controlled pressure
Customer to specify setting, in increments of 6,89 bar (100 psi) but coded in 100 psi units, within the 34,5-207 bar (500-3000 psi) range

Example
5.0 = 34,5 bar (500 psi)

4 Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
ERV1-10 models
6T = With SAE 6 size ports

ERV1-16 models
12T = With SAE 12 size ports

Continued in next column

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
ERV1-10 models
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

ERV1-16 models
10H = With SAE 10 size ports
12H = With SAE 12 size ports
4G = With G½" (BSPF) size ports
6G = With G¾" (BSPF) size ports

5 Voltage rating

		Amps	Lead color
00D	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue

6 Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" three pages on.
P = ½" NPT conduit port
Q = Spade terminal
W = Leadwire

Operating data
Performance is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

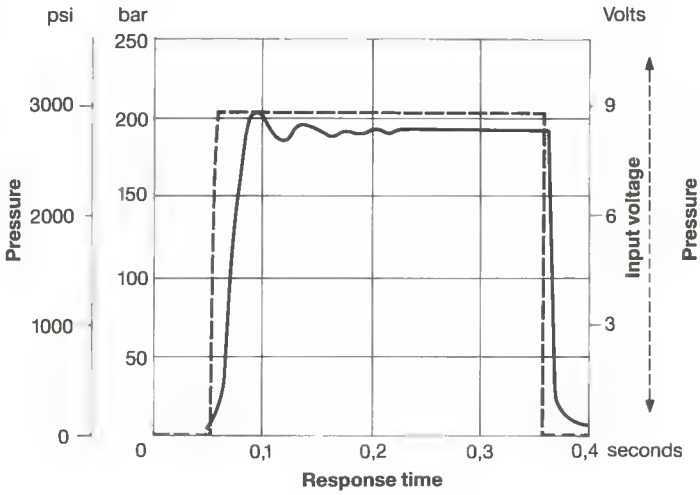
Max. pressure, both ports	207 bar (3000 psi)
Max. controlled pressure range: ERV1-10 ERV1-16	 2,07-207 bar (30-3000 psi) 3,5-207 bar (50-3000 psi)
Max. flow range	See 1 in "Model code" above
Performance characteristics	See graphs on next two pages
Electrical characteristics and options	See 5 and 6 in "Model code" above
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See three pages on
Cavity size: ERV1-10 ERV1-16	 C-10-2 C-16-2 For dimensions see page 247

Continued on next page

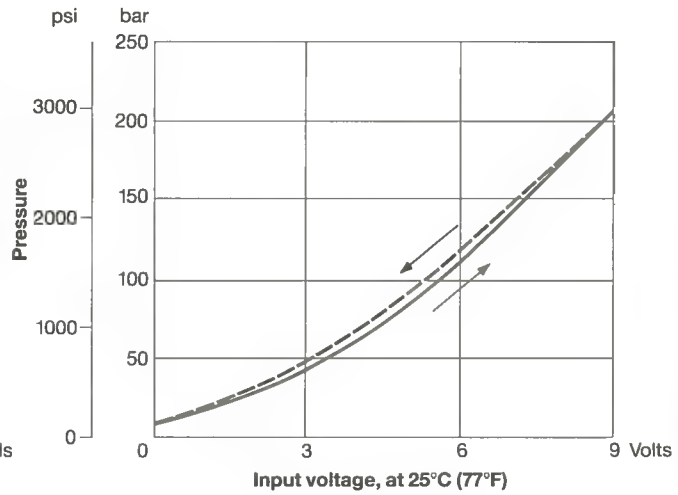
Mass, cartridge including solenoid	
ERV1-10	0,44 kg (0.98 lb) approx.
ERV1-16	0.66 kg (1.45 lb) approx.
Housing options:	
Standard light-duty type	See page 255
Standard fatigue-rated type	See page 251
Customized types	Consult your local sales engineer
Spare parts	See two pages on

Performance characteristics, ERV1-10 models
Cartridges only
Zero outlet pressure

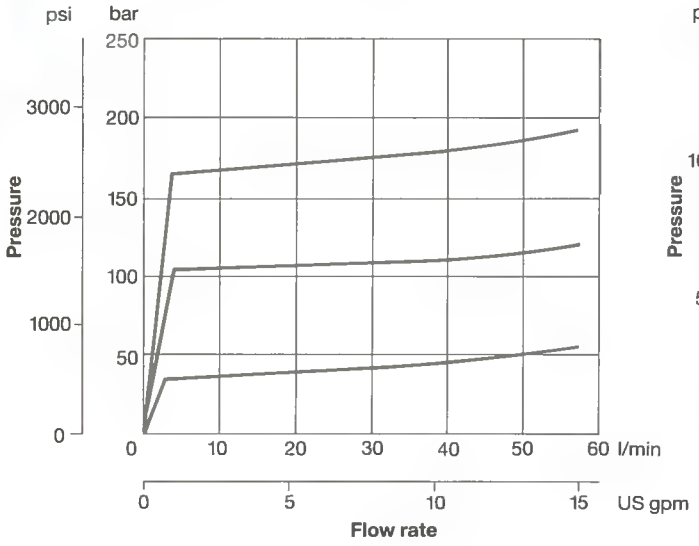
Step response



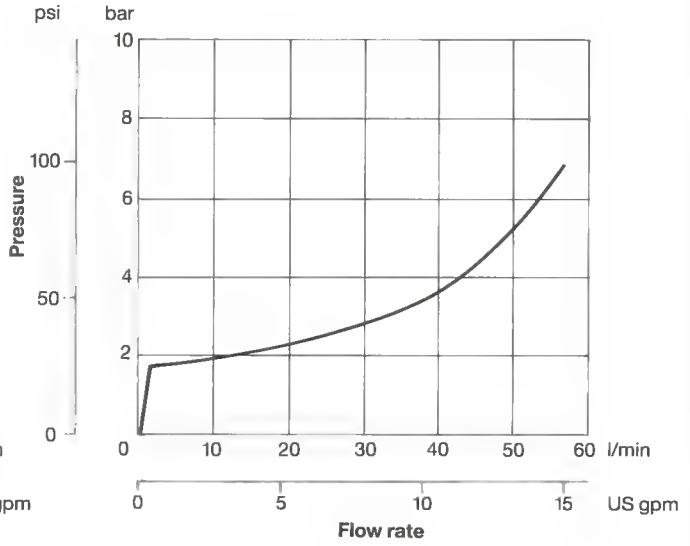
Pressure gain



Pressure override, energized

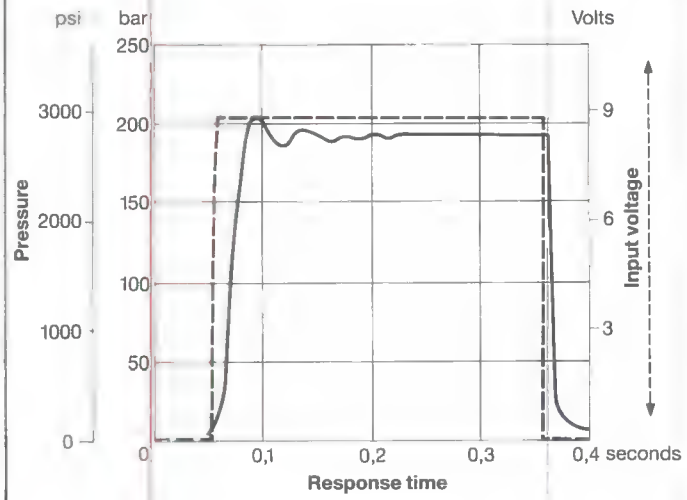


Pressure override, de-energized

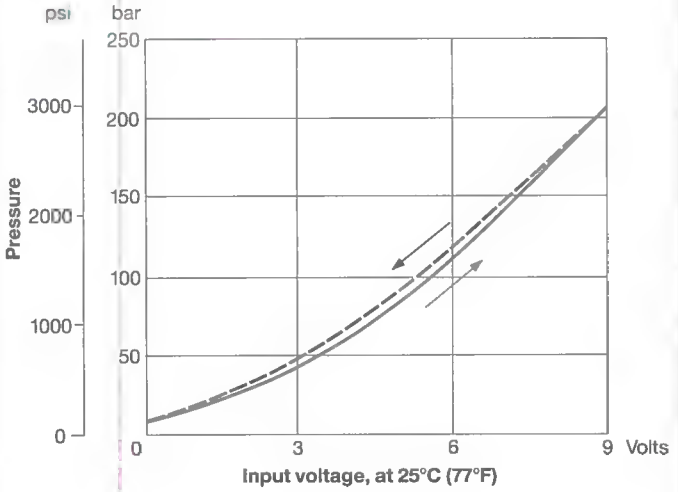


Performance characteristics, ERV1-16 models
Cartridges only
Zero outlet pressure

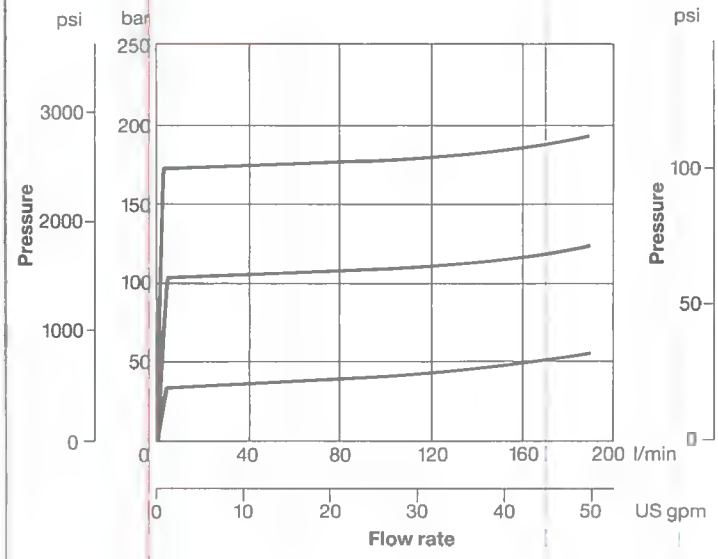
Step response



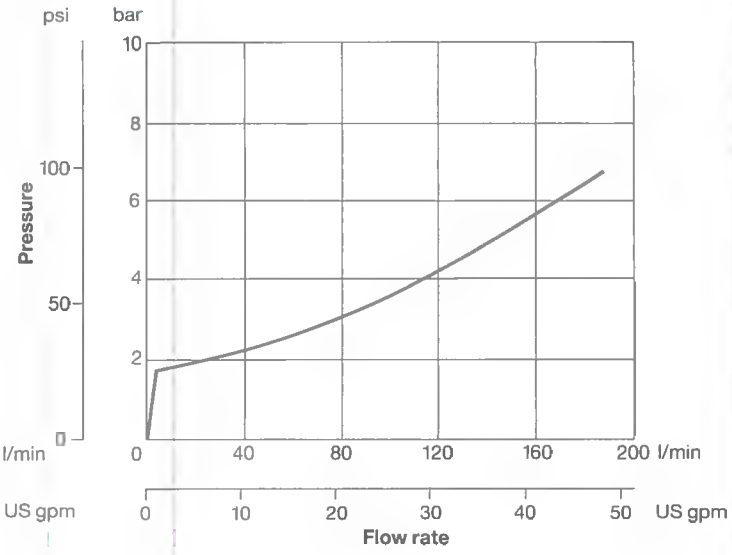
Pressure gain



Pressure override, energized

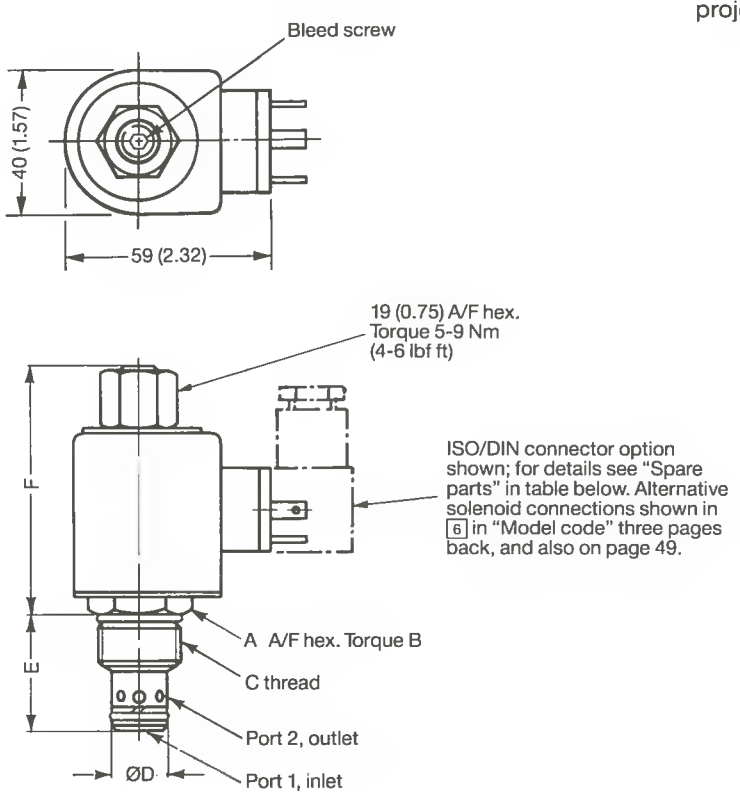


Pressure override, de-energized



Installation dimensions in mm (inches)

3rd angle projection



Model	A	B	C	ØD	E	F
ERV1-10	25,4 (1.0)	47-54 Nm (35-40 lbf ft)	0.875"-14 UNF	15,82 (0.623) 15,77 (0.621)	33,3 (1.31)	73 (2.87)
ERV1-16	38,1 (1.5)	108-122 Nm (80-90 lbf ft)	1.3125"-12 UN	28,55 (1.124) 28,52 (1.123)	44,45 (1.75)	79 (3.1)

Spare parts

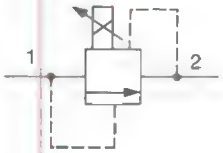
The only parts available are:

a.	Seal kits comprising external seals and back-up rings for:	Kit no.
	ERV1-10	SK-10-2
	ERV1-10V	SK-10V-2
	ERV1-16	SK-16-2
	ERV1-16V	SK-16V-2
b.	Solenoid coil and ancillary parts	See page 49, for DC voltage coils only
c.	ISO/DIN connector plug options:	Part no.
	Black, marked B	710775
	Gray, marked A	710776
		For dimensions see page 50

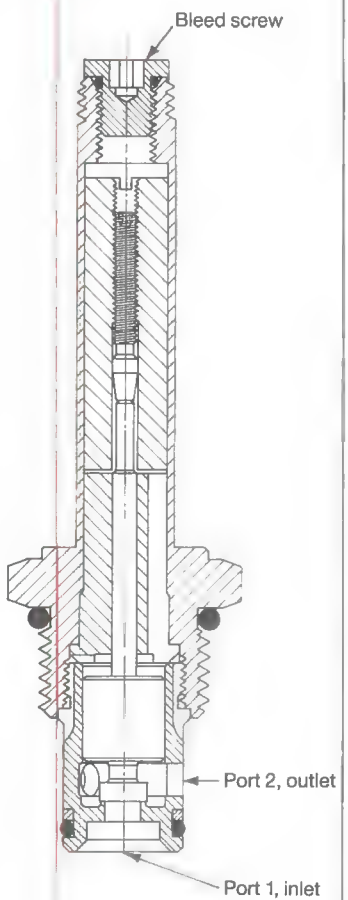
Proportional relief valves, direct acting series

ERV2-10

Functional symbol



Typical section
Solenoid omitted



Model and ordering code

ERV2-10(V)--***-*** ***
[1] [2] [3] [4] [5]

[1] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] Factory-set maximum controlled pressure
Customer to specify setting, in increments of 6,89 bar (100 psi) but coded in 100 psi units, within the 6,9-34,5 bar (100-500 psi) range

Example
5.0 = 34,5 bar (500 psi)

[3] Form
0 = Cartridge only

In light-duty housing;
207 bar (3000 psi) max.
6T = With SAE 6 size ports

Continued in next column

In NFPA fatigue-rated housing;
207 bar (3000 psi) max.
6H = With SAE 6 size ports
8H = With SAE 8 size ports
2G = With G¼" (BSPF) size ports
3G = With G⅜" (BSPF) size ports

[4] Voltage rating		Amps	Lead color
00D	= No coil	—	—
12D	= 12VDC	1,50	Red
24D	= 24VDC	0,75	Black
36D	= 36VDC	0,50	Blue

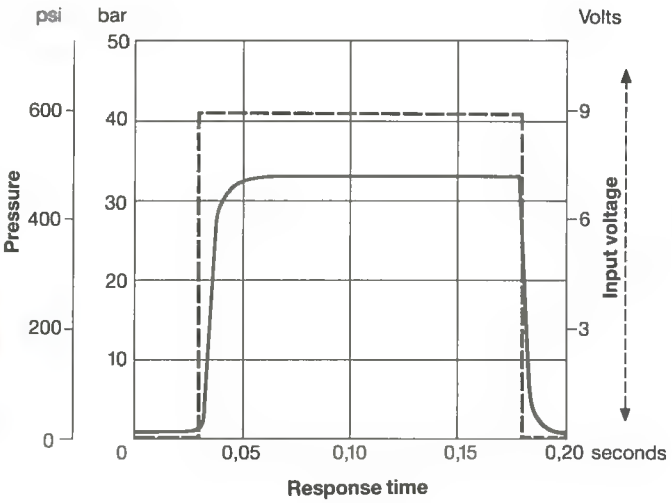
[5] Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" two pages on.
P = ½" NPT conduit port
Q = Spade terminal
W = Leadwire

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

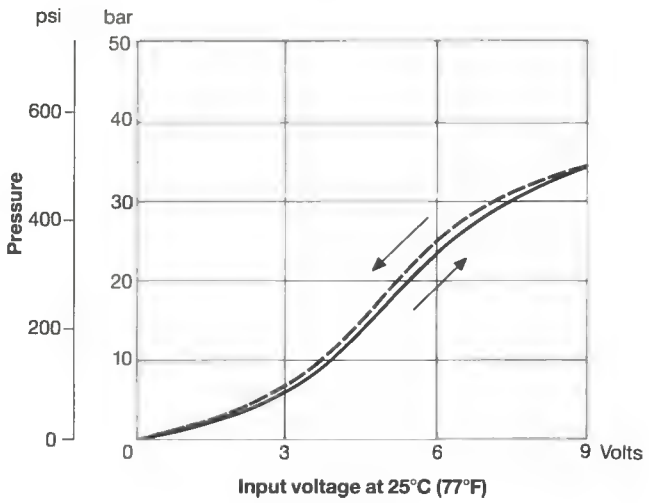
Max. pressure, both ports	207 bar (3000 psi)
Rated flow	2,8 l/min (0.75 US gpm)
Max. controlled pressure drop range	0-34,5 bar (0-500 psi)
Max. flow range	0,2-2,8 l/min (0.05-0.75 US gpm)
Performance characteristics	See graphs on next page
Electrical characteristics and options	See [4] and [5] in "Model code" above
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See two pages on
Cavity size	C-10-2 For dimensions see page 247
Mass, cartridge including solenoid	0,43 kg (0.95 lb) approx.
Housing options: Standard light-duty type Standard fatigue-rated type Customized types	 See page 255 See page 251 Consult your local sales engineer
Spare parts	See two pages on

Performance characteristics
Cartridges only
Zero outlet pressure

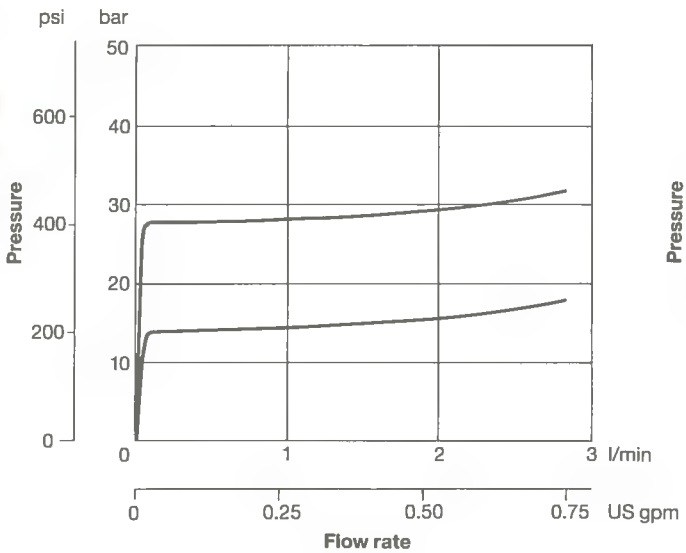
Step response



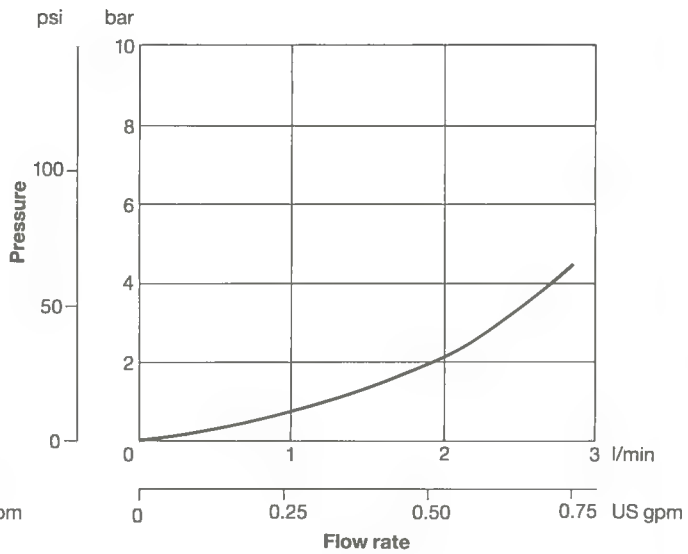
Pressure gain



Pressure override, energized

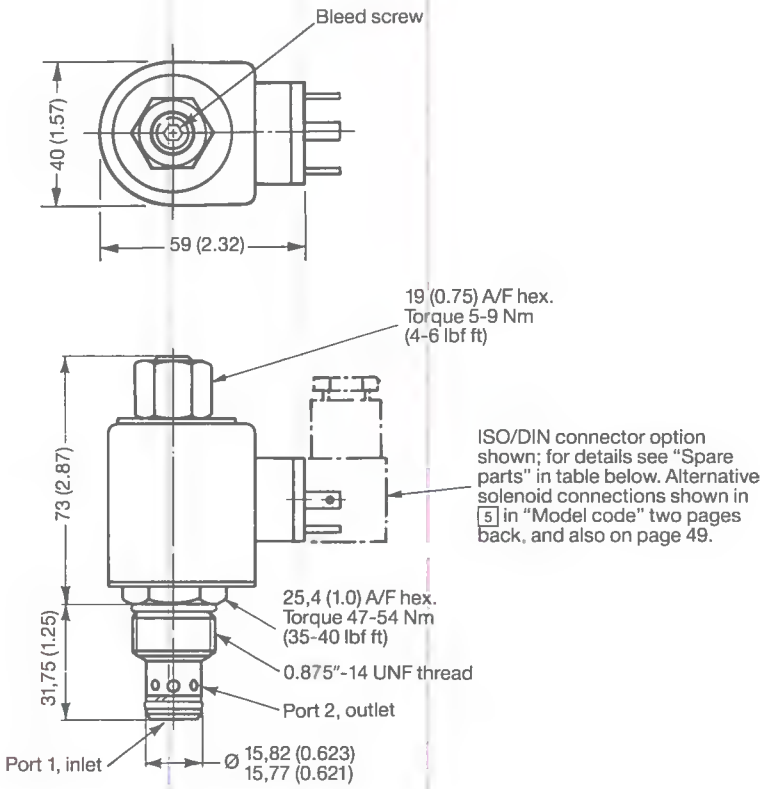


Pressure override, de-energized



Installation dimensions in mm (inches)

3rd angle projection



Spare parts

The only parts available are:

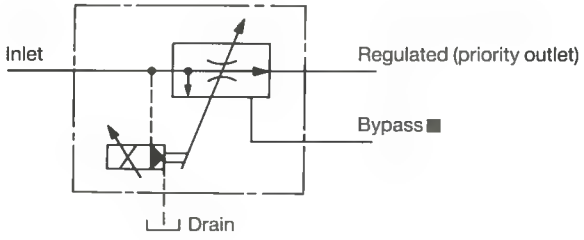
a. Seal kits comprising external seals and back-up rings for:	Kit no.
ERV2-10-**	SK-10-2
ERV2-10V-**	SK-10V-2
b. Solenoid coil and ancillary parts	See page 49, for DC voltage coils only
c. ISO/DIN connector plug options:	Part no.
Black, marked B	710775
Gray, marked A	710776
	For dimensions, see page 50

Pressure compensated priority flow controls, electro-proportionally controlled series

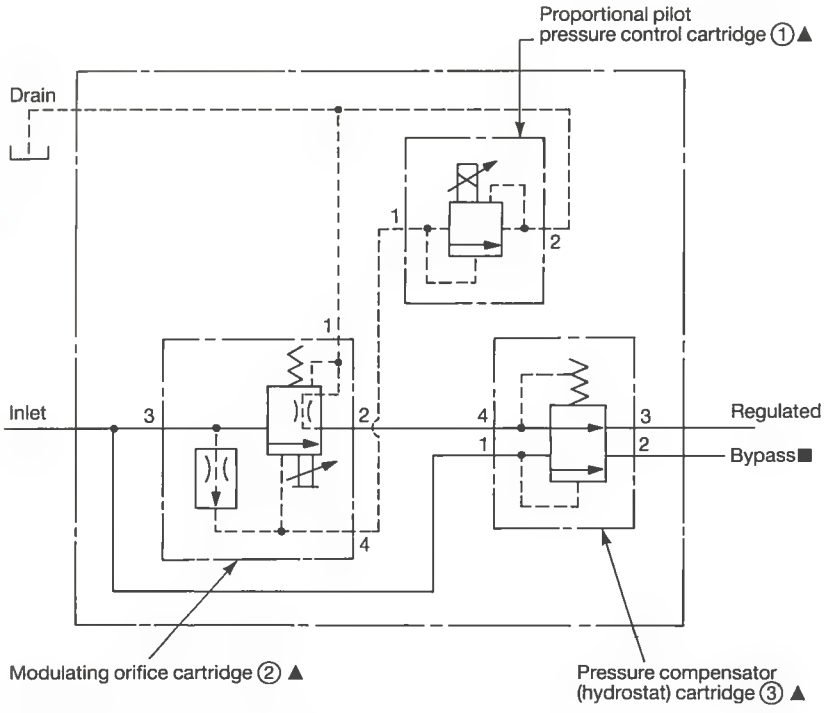
EPFR1-10/16

Functional symbols

Simplified symbol



Detailed symbol



■ By plugging the "Bypass" port the valve can be used as a proportionally controlled pressure compensated flow control
▲ See "Spare parts" three pages on for identities

Model and ordering code

EPFR1-(V)-** **-***- *** ***
1 2 3 4 5 6 7

1 Nominal size
10 or 16; see 3 below

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Regulated priority flow range
10 = 0-37,8 l/min (0-10 US gpm), for EPFR1-10 models
35 = 0-132 l/min (0-35 US gpm), for EPFR1-16 models

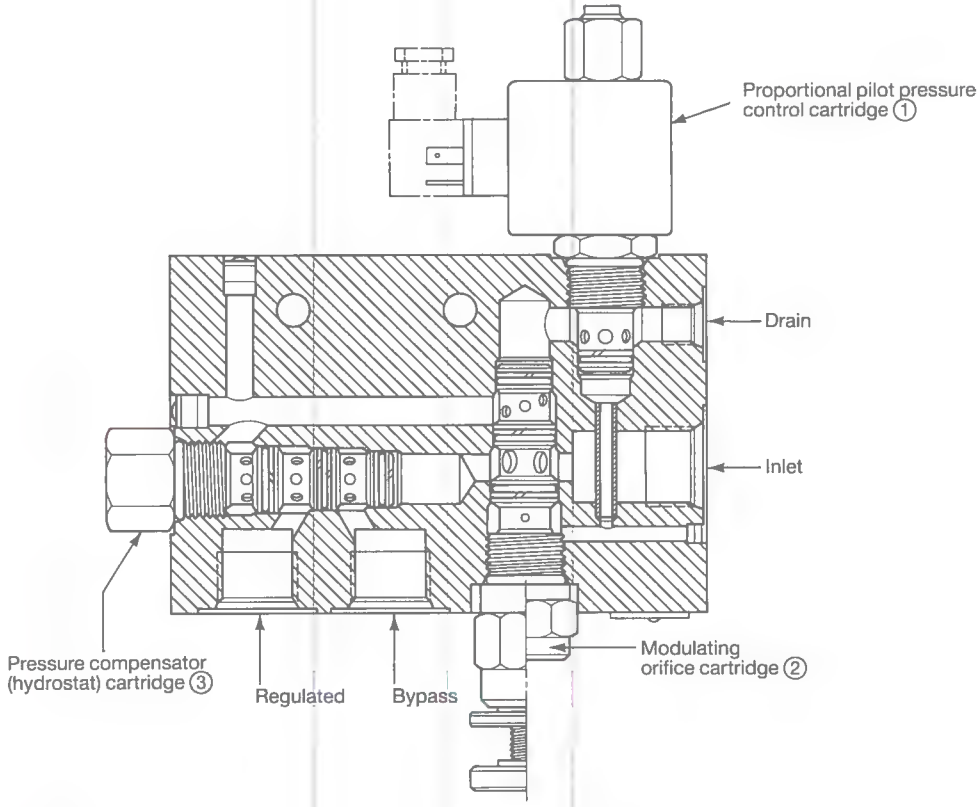
4 Minimum priority flow setting
Blank = Zero flow setting
M = Manual adjustment

5 Form
10T = With SAE 10 size main ports◪; EPFR1-10 models
16T = With SAE 16 size main ports◪; EPFR1-16 models
◪ SAE 4 size drain port

6 Voltage rating		Amps	Lead color
00	= No coil	—	—
12D	= 12V DC	1,50	Red
24D	= 24V DC	0,75	Black
36D	= 36V DC	0,50	Blue

7 Connector types
Blank = No coil
G = ISO 4400 (DIN 43650) connector. Order requisite connector plug separately; see "Spare parts" three pages on.
P = ½" NPT conduit port
Q = Spade terminal
W = Leadwire

Typical section



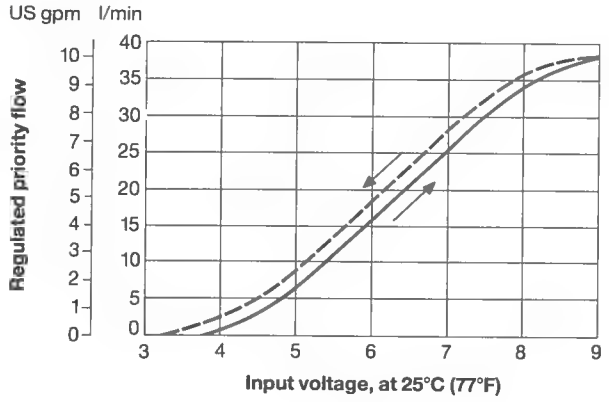
EPFR1-10
Similar construction for EPFR1-16

Operating data Performance is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)	
Max. pressure, all ports	207 bar (3000 psi)
Flow ratings: Inlet port, EPFR1-10 models Inlet port, EPFR1-16 models Priority outlet, EPFR1-10 models Priority outlet, EPFR1-16 models	 57 l/min (15 US gpm) 170 l/min (45 US gpm) 38 l/min (10 US gpm) 132 l/min (35 US gpm)
Pilot flow, from drain port	1,1 l/min (0.3 US gpm) approx.
Electrical characteristics and options	See [6] and [7] in "Model code" on previous page
Flow gain, regulated priority flow	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions	See next page
Mass, complete assembly including solenoid: EPFR1-10 EPFR1-16	 0,75 kg (1.66 lb) approx. 1,72 kg (3.78 lb) approx.
Housing options: Standard light-duty type Customized types	 As shown Consult your local sales engineer
Spare parts	See two pages on

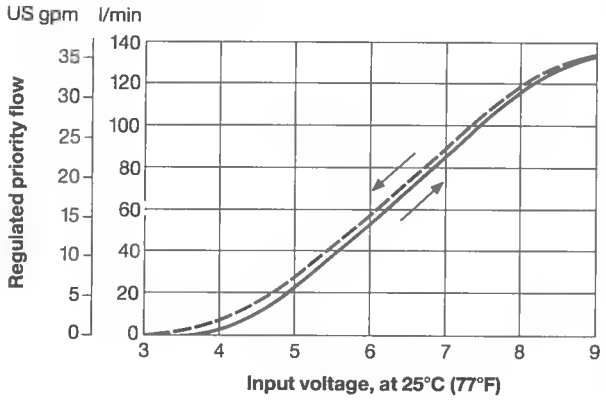
Flow gain

Regulated priority flow

EPFR1-10

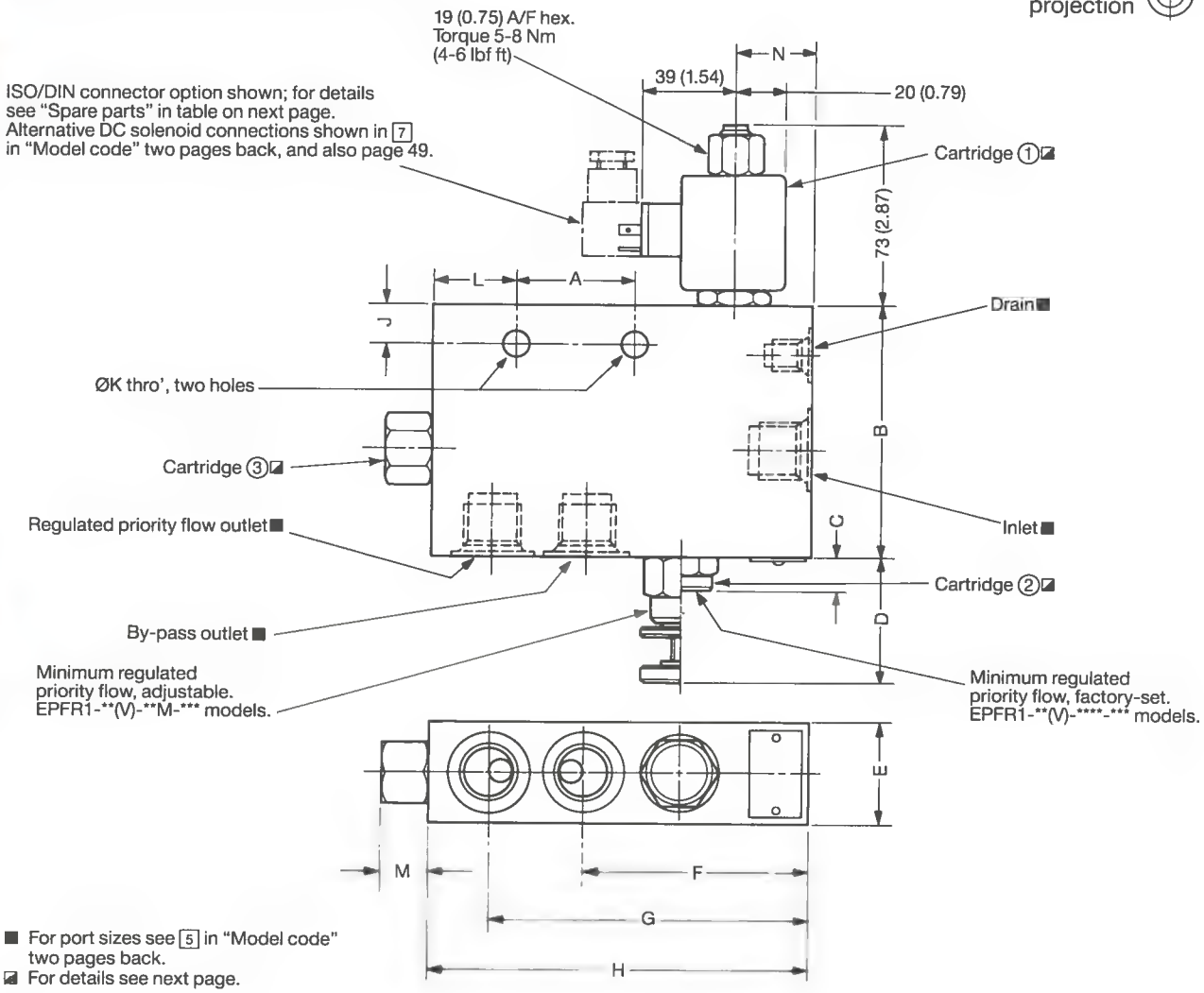


EPFR1-16



Installation dimensions in mm (inches)

3rd angle projection



■ For port sizes see 5 in "Model code" two pages back.
◪ For details see next page.

Model	A	B	C	D	E	F	G	H	J	ØK	L	M	N
EPFR1-10	47,75 (1.88)	101,0 (3.97)	14,3 (0.56)	49,1 (1.93)	41,4 (1.63)	89,9 (3.54)	128,0 (5.04)	151,6 (5.97)	15,0 (0.59)	10,3 (0.406)	34,0 (1.34)	28,6 (1.125)	28,6 (1.125)
EPFR1-16	76,2 (3.00)	126,2 (4.97)	33,8 (1.33)	89,9 (3.54)	50,0 (1.97)	108,0 (4.25)	162,0 (6.38)	203,2 (8.00)	21,6 (0.85)	11,9 (0.468)	44,45 (1.75)	47,6 (1.88)	27,0 (1.06)

Spare parts

The only parts available are:

a. Cartridges

For model	Cartridges ①▲	②■	③◪
EPFR1-10-10-M-10T-**D*	ERV2-10-2.1-0-**D*	MOS1-10-M-0-10	PCS4-10-0-160
EPFR1-10-10-**-10T-**D*	ERV2-10-2.1-0-**D*	MOS1-10-F-0-10	PCS4-10-0-160
EPFR1-10V-10-M-10T-**D*	ERV2-10V-2.1-0-**D*	MOS1-10V-M-0-10	PCS4-10V-0-160
EPFR1-10V-10-**-10T-**D*	ERV2-10V-2.1-0-**D*	MOS1-10V-F-0-10	PCS4-10V-0-160
EPFR1-16-35-M-16T-**D*	ERV2-10-2.1-0-**D*	MOS1-16-M-0-35	PCS4-16-0-160
EPFR1-16-35-**-16T-**D*	ERV2-10-2.1-0-**D*	MOS1-16-F-0-35	PCS4-16-0-160
EPFR1-16V-35-M-16T-**D*	ERV2-10V-2.1-0-**D*	MOS1-16V-M-0-35	PCS4-16V-0-160
EPFR1-16V-35-**-16T-**D*	ERV2-10V-2.1-0-**D*	MOS1-16V-F-0-35	PCS4-16V-0-160

b. Seal kits for cartridges, comprising external seals and back-up rings; one kit per cartridge

Cartridge	Kit no.
ERV2-10-2.1	SK-10-2
ERV2-10V-2.1	SK-10V-2
MOS1-10-*	SK-10-4
MOS1-10V-*	SK-10V-4
MOS1-16-*	SK2-16-4
MOS1-16V-*	SK2-16V-4
PCS4-10-0	SK3-10-4
PCS4-10V-0	SK3-10V-4
PCS4-16-0	SK3-16-4
PCS4-16V-0	SK3-16V-4

c. Solenoid coil and ancillary parts — See page 49, for DC voltage coils only

d. ISO/DIN connector plug options:

	Part no.
Black, marked B	710775
Gray, marked A	710776

For dimensions see page 50

▲ For full details see page 200
■ For full details see page 239
□ For full details see page 236

Load controls

The prime function of Vickers Modular load control valves is to efficiently prevent loads running ahead of pump supply and provide positive load holding. In doing this they help prevent cavitation in the inlet side of the machine actuator. Operating basically as piloted counterbalance valves with reverse free-flow checks, they can provide these added benefits:

- Only a minimum pump/supply pressure needed to maintain positive control of machine actuator movements.
- Positive load-holding in any position (see below regarding hydraulic motors).
- Thermal expansion relief.
- Full flow overload relief function.

The following product pages include formulae for determining pilot pressures for various conditions. Optimum performance is usually attained when the cracking pressure is set at approximately 1.3 × load-induced pressure.

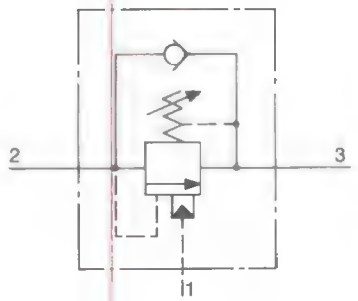
Vickers Modular load control valves are produced in a variety of forms to meet the majority of load control requirements, e.g.:

- Single cartridges may be installed directly into cavities machined in the actuator body. This is the safest installation as any pipe line failure would not affect load holding.
- Line mounting of single or dual functions can simplify installation of load control valves in many applications.
- Dual function models which can introduce low-pressure make-up flow to prevent cavitation, can be line mounted in hydrostatic split transmissions.
- Dual function models with brake control are available for hydraulic motor drives. Because all hydraulic motors have a degree of internal leakage under load, many applications require a hydraulically released brake to prevent shaft creep under load when it should be held stationary. The brake control always directs pilot flow to or from the brake. It also has a customer-specified orifice and check function, controlling brake application but allowing rapid release.
- Customized models can be designed and made by Vickers Modular, e.g. for direct installation on cylinders or motors.

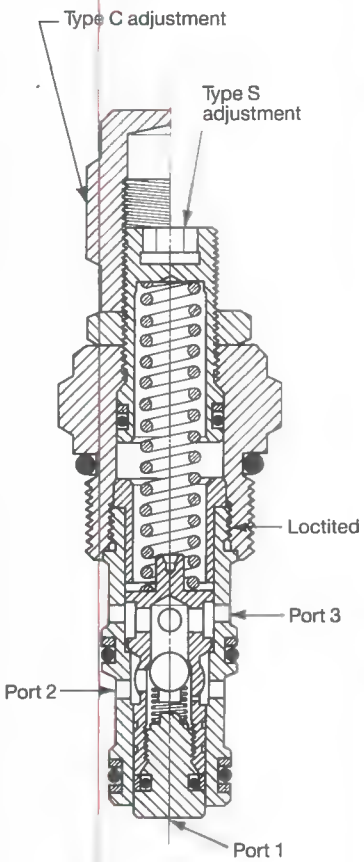
Counterbalance or holding valves, with reverse flow check and remote control pilot port

MCV9-10

Functional symbol



Typical section



Model and ordering code

MCV9-10(V)- * -0-50/**
[1] [2] [3]

[1] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] Cracking pressure adjustment
S = Screw type
C = Cap

[3] Factory-set cracking pressure, port 2
Within range in table below
Blank = Normal factory setting, at approx. mid-range.
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	345 bar (5000 psi)
Rated flow	15 l/min (4 US gpm)
Cracking pressure adjustment range, port 2 (Ports 1 and 3 at zero pressure)	34,5-344 bar (500-5000 psi)
Pilot pressure calculation	See formula below
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-10-3 For dimensions see page 247
Mass, cartridge only	0,15 kg (0.33 lb)
Housing options: Customized types only, suitable for 345 bar (5000 psi) max. pressure	Consult your local sales engineer
Spare parts	See next page

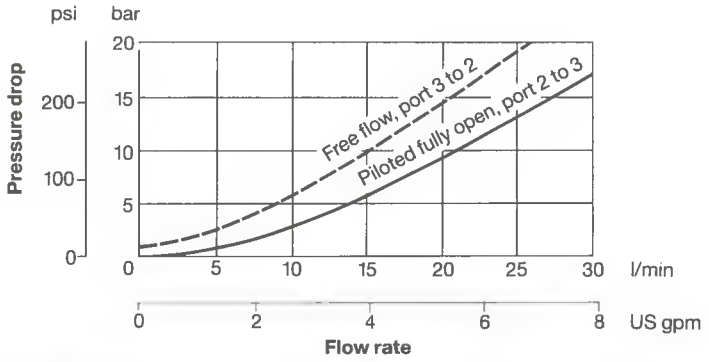
Pilot pressure calculation
To open valve by remote control.

Pilot pressure, nominal at port 1 =

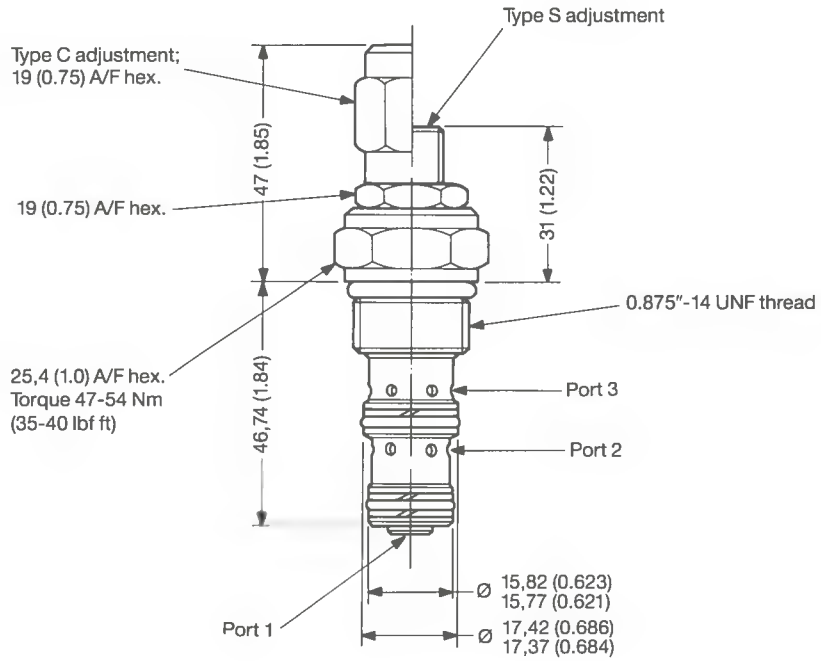
$$\frac{\text{Cracking pressure} + (9{,}25 \times \text{Port 3 pressure}) - \text{Port 2 pressure}}{8{,}25}$$

Pressure drop characteristics

Cartridges only



Installation dimensions in mm (inches)



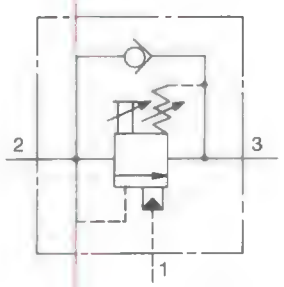
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
MCV9-10-*	SK3-10-3
MCV9-10V-*	SK3-10V-3

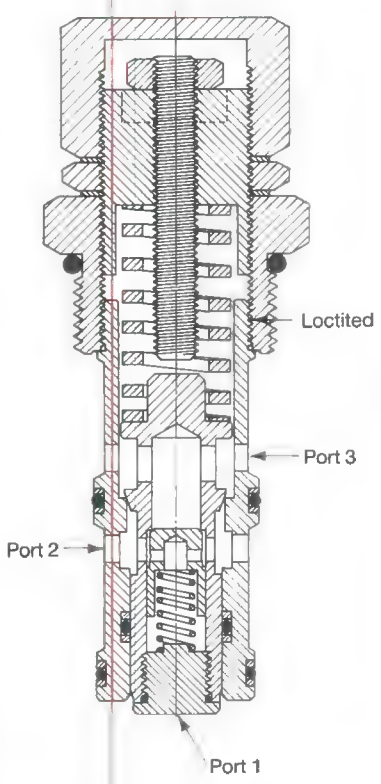
Counterbalance or holding valves, with reverse flow check and remote control pilot port

MCV3-16

Functional symbol



Typical section



Model and ordering code

MCV3-16(V)-C*-0-50/****
[1] [2] [3]

[1] **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

[2] **Throttle stroke**
See page 00
125 = 3,2mm (0.125"); standard setting.
Alternatively, a customer can specify his requirement in the same way.

[3] **Factory-set cracking pressure, port 2**
Within range in table below
Blank = Normal factory setting, at approx. mid-range.
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	345 bar (5000 psi)
Rated flow	95 l/min (25 US gpm)
Cracking pressure adjustment range, port 2 (ports 1 and 3 at zero pressure)	34,5-344 bar (500-5000 psi)
Pilot pressure calculation	See formula below
Pressure drop characteristics	See graph on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size	C-16-3 For dimensions see page 247
Mass, cartridge only	0,47 kg (1.04 lb)
Housing options: Customized types only, suitable for 345 bar (5000 psi) max. pressure	Consult your local sales engineer
Spare parts	See next page

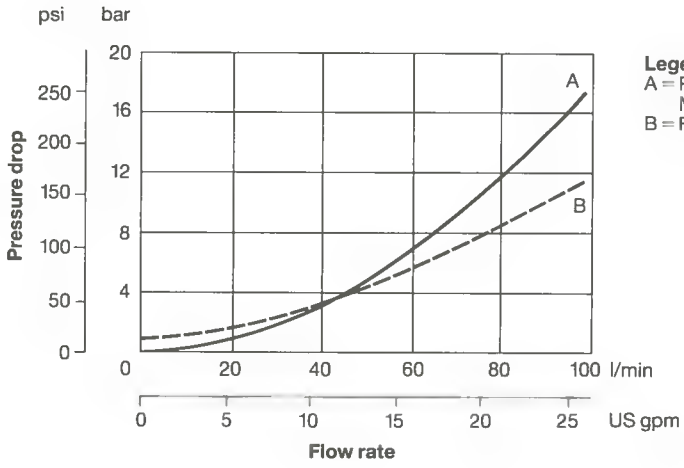
Pilot pressure calculation
To open valve by remote control.

Pilot pressure, nominal at port 1 =

$$\frac{\text{Spring-set pressure} + (10{,}6 \times \text{Port 3 pressure}) - \text{Port 2 pressure}}{9{,}6}$$

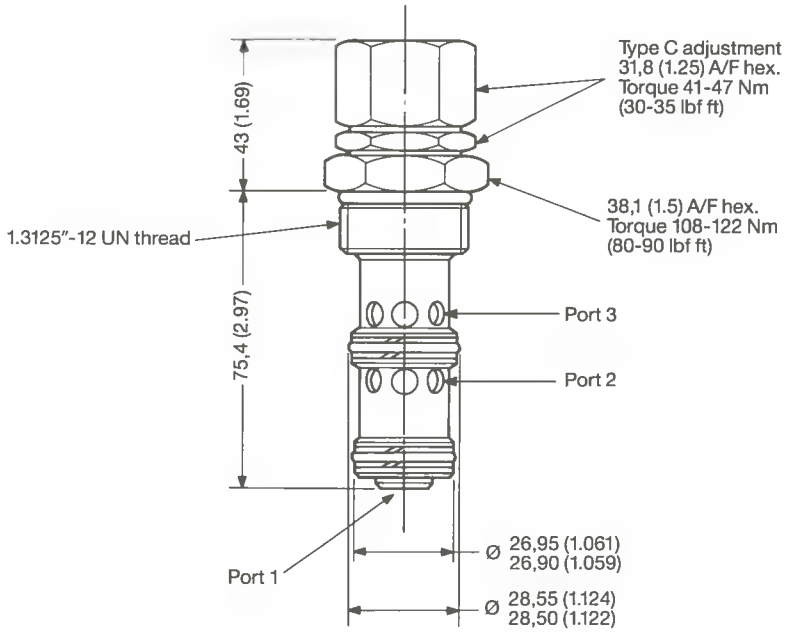
Pressure drop characteristics

Cartridges only



Legend
A = Piloted fully open, port 2 to 3. MCV3-16(V)-C125 models.
B = Free flow, port 3 to 2. All models.

Installation dimensions in mm (inches)



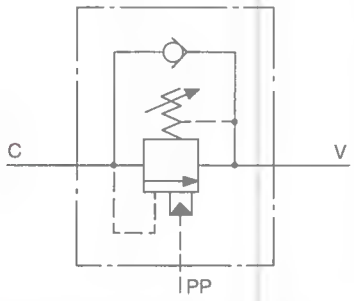
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
MCV3-16-C	SK2-16-3
MCV3-16V-C	SK2-16V-3

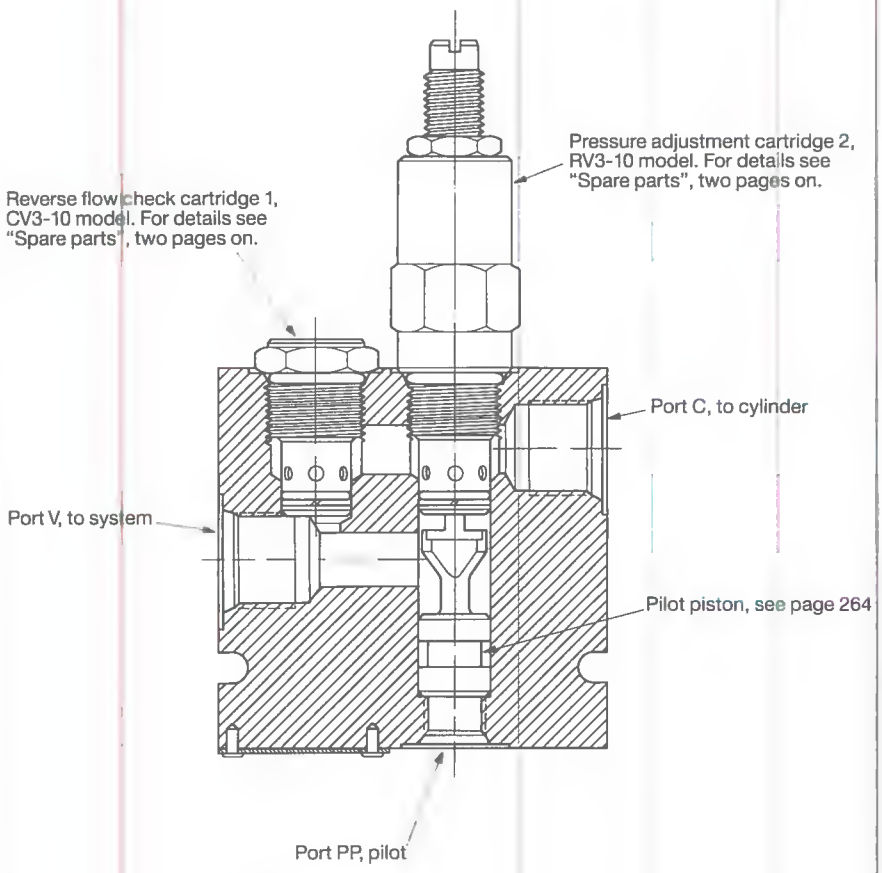
Counterbalance or holding valves, two-stage design with reverse flow check and remote control pilot port

MCV1-10

Functional symbol



Typical section



Model and ordering code

MCV1-10(V)- * -*-**/****

1 2 3 4 5

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Cracking pressure adjustment
S = Screw
F = Factory-set

3 Form
In light-duty housing;
207 bar (3000 psi) max.
8T = With SAE 8 size ports▲
10T = With SAE 10 size ports▲
▲ Ports C and V only, port PP is always of SAE 6 size

4 Cracking pressure adjustment range, port C, bar (psi)
3 = 3,45-20,6 (50-300)
6 = 6,90-41,3 (100-600)
9 = 13,8-62,0 (200-900)
18 = 20,7-124 (300-1800)
27 = 0-189 (0-2750)
For higher pressure models, consult your local sales engineer.

5 Factory-set cracking pressure, port C
Within ranges in 4 above
Blank = Normal factory setting; at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)▲
Rated flow	76 l/min (20 US gpm)
Cracking pressure adjustment range, port C (Ports PP and V at zero pressure)	See [4] and [5] in "Model code" on previous page
Pilot pressure calculation	See formula below
Pressure drop characteristics	See graph below
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" on previous page and also page 266
Installation dimensions	See next page
Mass	0,92 kg (2.02 lb) approx.
Spare parts	See next page

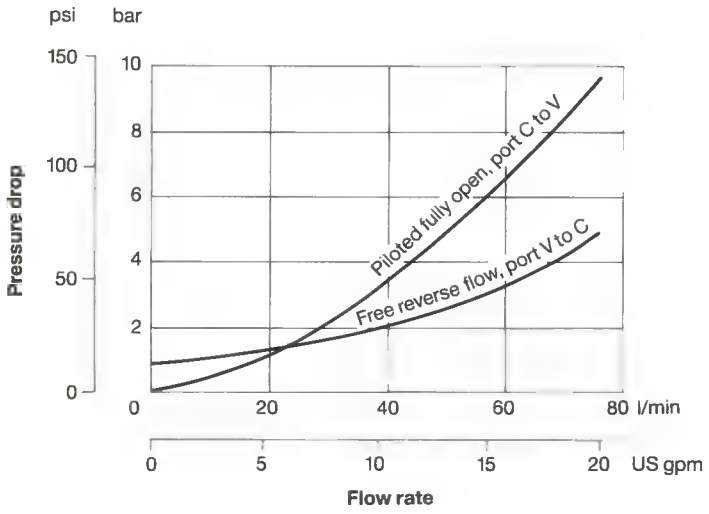
▲ For higher pressures, consult your local sales engineer

Pilot pressure calculation
To open valve by remote control.

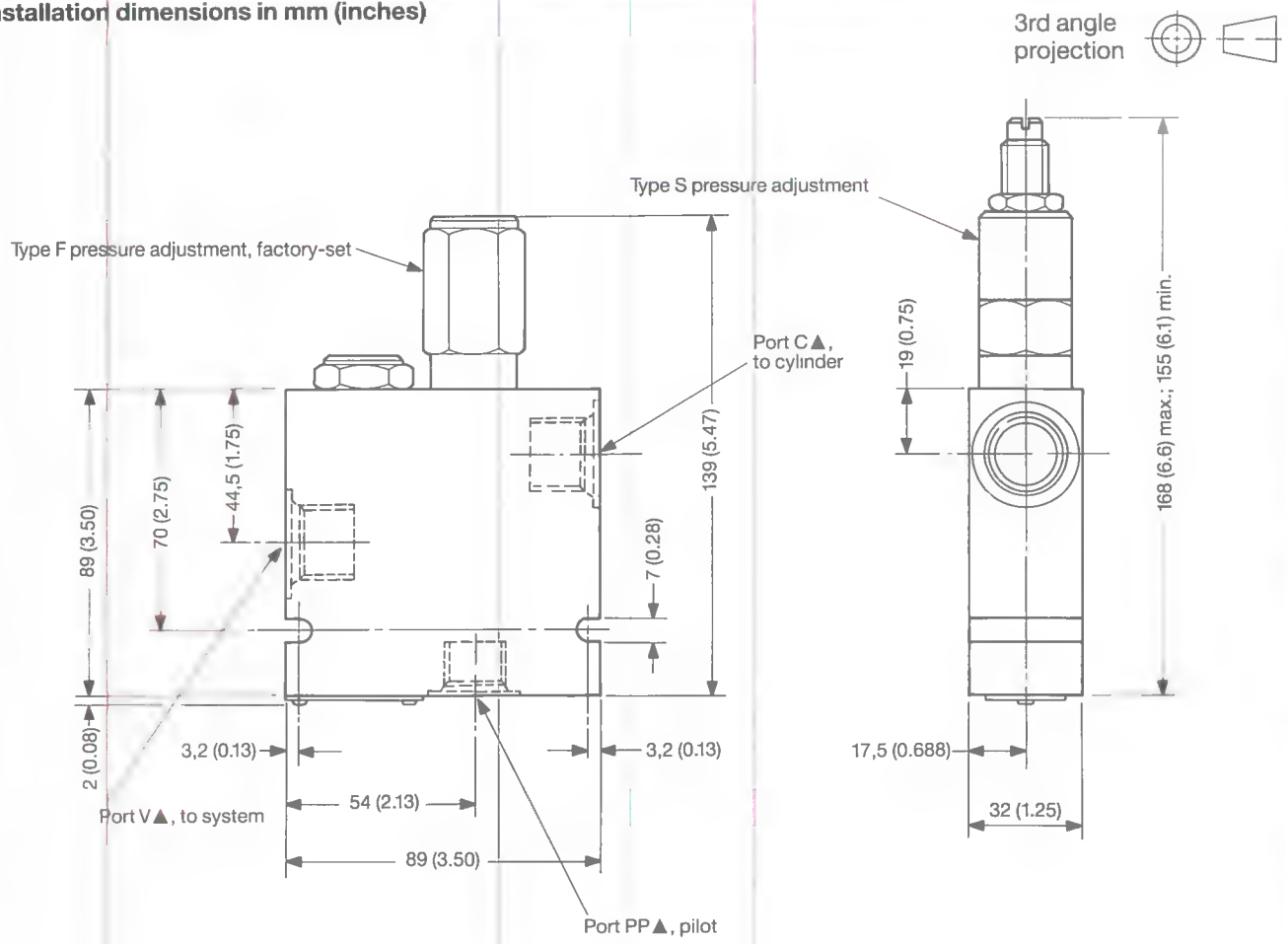
Pilot pressure, nominal at port PP =

$$\frac{\text{Valve set pressure} + (5 \times \text{Port V pressure}) - \text{Port C pressure}}{4}$$

Pressure drop characteristics



Installation dimensions in mm (inches)



▲ For sizes see 3 in "Model code", two pages back

Spare parts

The only parts available are cartridges and seal kits (comprising external seals and back-up rings)

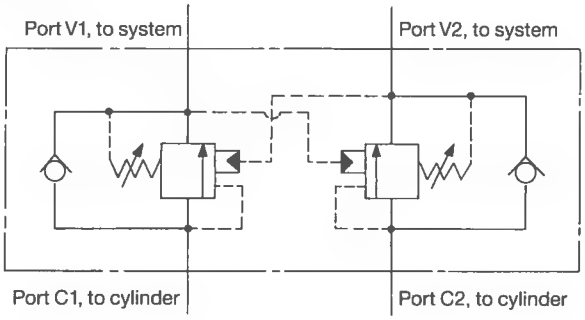
	Cartridge 1 △		Cartridge 2 △	
For model■	Model	Seal kit◪	Model■	Seal kit◪
MCV1-10-F-***-**/**	CV3-10-P-0-10	SK-10-2	RV3-10-F-0-**/**	SK-10-2
MCV1-10-S-***-**/**	CV3-10-P-0-10	SK-10-2	RV3-10-S-0-**/**	SK-10-2
MCV1-10V-F-***-**/**	CV3-10V-P-0-10	SK-10V-2	RV3-10V-F-0-**/**	SK-10V-2
MCV1-10V-S-***-**/**	CV3-10V-P-0-10	SK-10V-2	RV3-10V-S-0-**/**	SK-10V-2

■ Asterisks in bold type denote the pressure adjustment range code common to the model designation of a given MCV1 assembly and related RV3 cartridge.
△ One per MCV1 valve. For details, see page 171 for CV3-10 valves and page 84 for RV3-10 valves.
◪ One per cartridge.

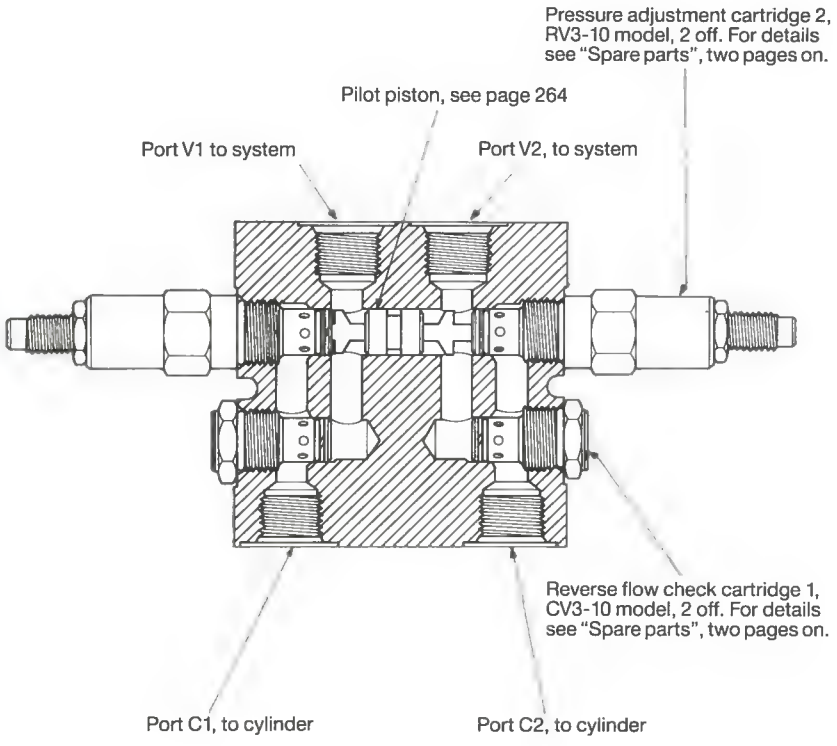
Dual counterbalance or holding valves, with reverse flow checks and internal cross-line piloting

MCV2-10

Functional symbol



Typical section



Model and ordering code

MCV2-10(V)- * -*-**/****

1 2 3 4 5

1 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

2 Cracking pressure adjustment
S = Screw
F = Factory-set

3 Form
In light-duty housing;
207 bar (3000 psi) max.
8T = With SAE 8 size ports
10T = With SAE 10 size ports

4 Cracking pressure adjustment range, ports C1 and C2, bar (psi)
3 = 3,45-20,6 (50-300)
6 = 6,90-41,3 (100-600)
9 = 13,8-62,0 (200-900)
18 = 20,7-124 (300-1800)
27 = 0-189 (0-2750)
For higher pressure models, consult your local sales engineer.

5 Factory-set cracking pressure, ports C1 and C2
Within ranges in 4 above.
Both RV3 cartridges set at the same pressure.
Blank = Normal factory setting; at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)▲
Rated flow	76 l/min (20 US gpm)
Cracking pressure adjustment range, ports C1 and C2 (ports V1 and V2 at zero pressure)	See [4] and [5] in "Model code" on previous page
Pilot pressure calculations	See formulae below
Pressure drop characteristics	See graph below
Hydraulic fluids, temperature ranges and filtration recommendations	See [1] in "Model code" on previous page, and also page 266
Installation dimensions	See next page
Mass	1,65 kg (3.62 lb) approx.
Spare parts	See next page

▲ For higher pressures, consult your local sales engineer

Pilot pressure calculations

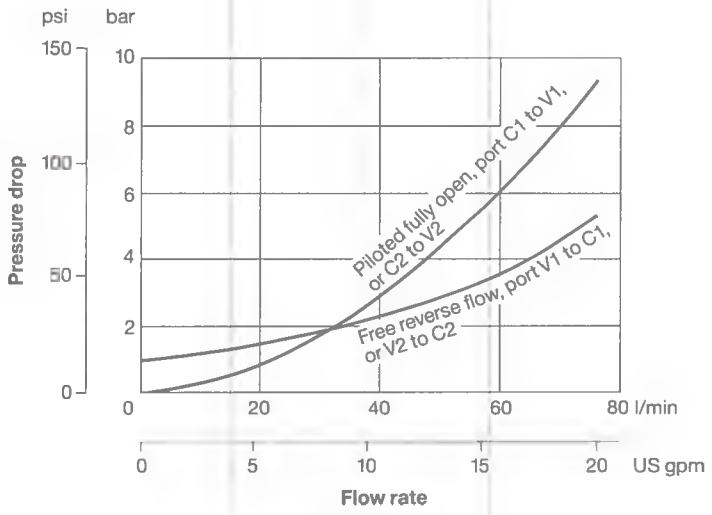
1. Internal pilot pressure, nominal at port V2 =

$$\frac{\text{Valve set pressure} + (5 \times \text{Port V1 pressure}) - \text{Port C1 pressure}}{4}$$

2. Internal pilot pressure, nominal at port V1 =

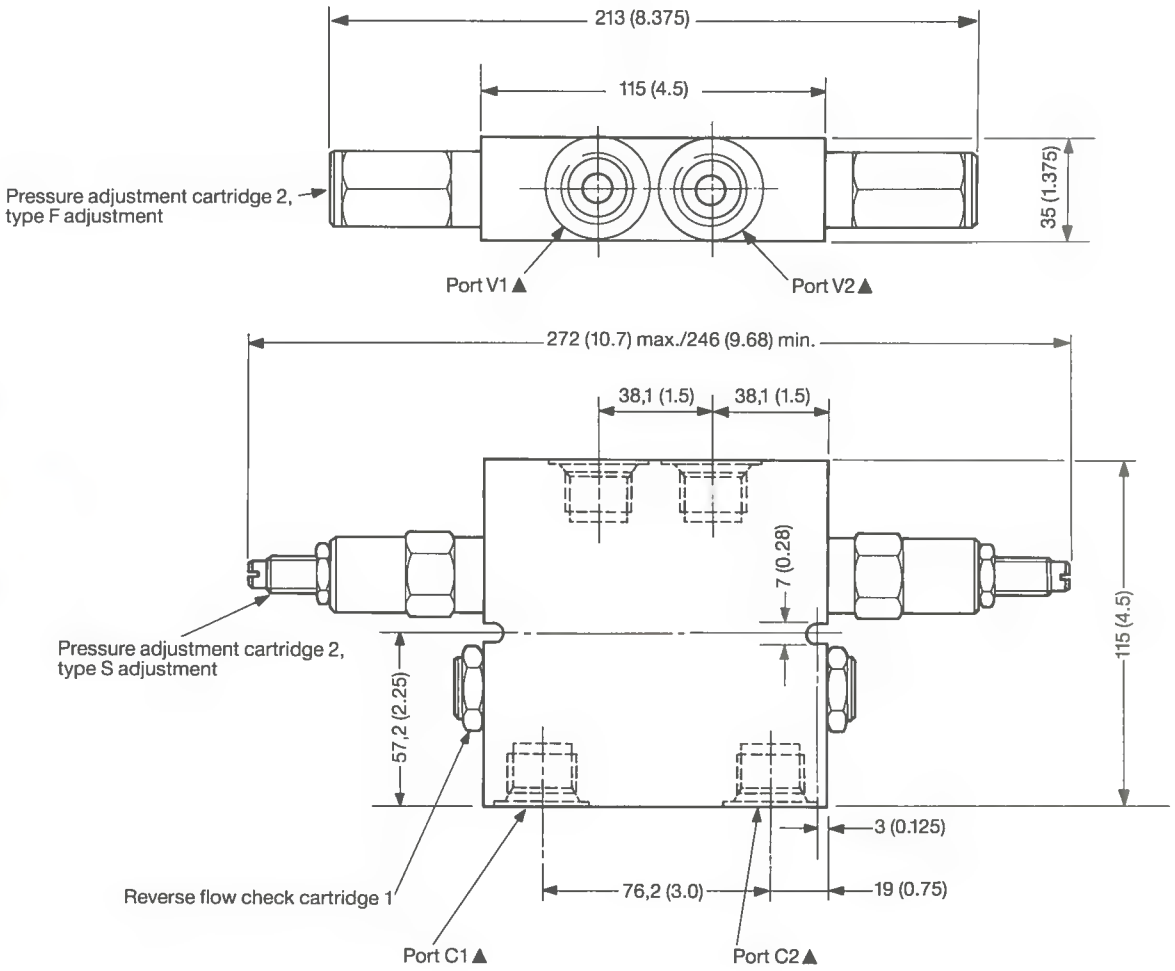
$$\frac{\text{Valve set pressure} + (5 \times \text{Port V2 pressure}) - \text{Port C2 pressure}}{4}$$

Pressure drop characteristics



Installation dimensions in mm (inches)

3rd angle projection



▲ For sizes see [3] in "Model code", two pages back

Spare parts

The only parts available are cartridges and seal kits (comprising external seals and back-up rings)

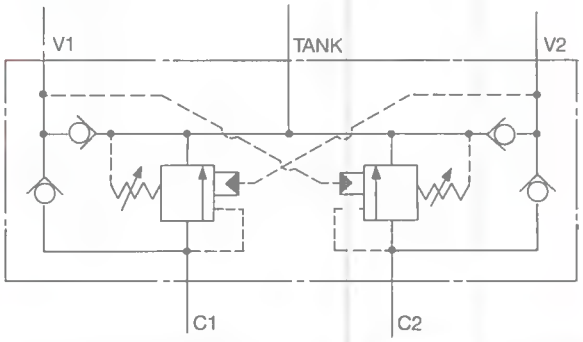
For model■	Cartridge 1△ Model	Cartridge 1△ Seal kit◪	Cartridge 2△ Model■	Cartridge 2△ Seal kit◪
MCV2-10-F-***-**/**	CV3-10-P-0-10	SK-10-2	RV3-10-F-0-**/**	SK-10-2
MCV2-10-S-***-**/**	CV3-10-P-0-10	SK-10-2	RV3-10-S-0-**/**	SK-10-2
MCV2-10V-F-***-**/**	CV3-10V-P-0-10	SK-10V-2	RV3-10V-F-0-**/**	SK-10V-2
MCV2-10V-S-***-**/**	CV3-10V-P-0-10	SK-10V-2	RV3-10V-S-0-**/**	SK-10V-2

■ Asterisks in bold type denote the pressure adjustment range code common to the model designation of a given standard MCV2 assembly and related RV3 cartridge.
△ Two per MCV2 valve. For details, see page 171 for CV3-10 valves and page 84 for RV3-10 valves.
◪ One per cartridge.

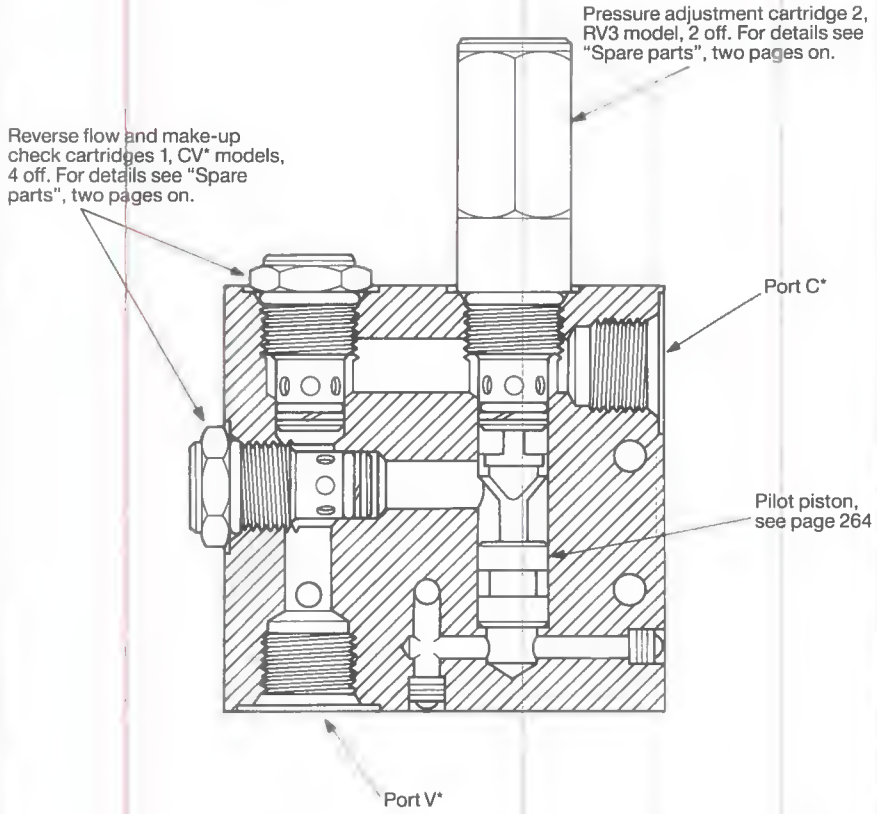
Dual counterbalance or holding valves, with reverse flow checks and low-pressure make-up inlet

MCV4-10/16

Functional symbol



Typical section



MCV4-10
Similar construction for MCV4-16

Model and ordering code

MCV4-(V)- * -***-**/****

1 2 3 4 5 6

1 Nominal size/rated flow
10 = 76 l/min (20 US gpm)
16 = 151 l/min (40 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Cracking pressure adjustment
S = Screw
F = Factory-set (option for MCV4-10 only)

4 Form
In light-duty housing;
207 bar (3000 psi) max.
MCV4-10 models
8T = With SAE 8 size ports
10T = With SAE 10 size ports
MCV4-16 models
12T = With SAE 12 size ports
16T = With SAE 16 size ports

5 Cracking pressure adjustment range, ports C1 and C2, bar (psi)
MCV4-10 models
3 = 3,45-20,6 (50-300)
6 = 6,90-41,3 (100-600)
9 = 13,8-62,0 (200-900)
18 = 20,7-124 (300-1800)
27 = 0-189 (0-2750)
MCV4-16 models
13 = 3,45-89,6 (50-1300)
For higher pressure models in MCV4-10 or 16 series, consult your local sales engineer.

6 Factory-set cracking pressure, ports C1 and C2
Within ranges in 5 above.
Both RV3 cartridges set at the same pressure.
Blank = Normal factory setting; at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Max. pressure, all ports	207 bar (3000 psi)▲
Rated flow	See [1] in "Model code" on previous page
Cracking pressure adjustment range, ports C1 and C2 (Ports V1 and V2 at zero pressure)	See [5] and [6] in "Model code" on previous page
Pilot pressure calculations	See formulae below
Pressure drop characteristics	See graphs below
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions	See next page
Mass: MCV4-10 MCV4-16	 3,04 kg (6.7 lb) approx. 6,54 kg (14.4 lb) approx.
Spare parts	See next page

▲ For higher pressure models, consult your local sales engineer

Pilot pressure calculations

1. For MCV4-10 models

Internal pilot pressure, nominal at port V2 =

$$\frac{\text{Valve set pressure} + (5 \times \text{Port V1}\blacksquare\ \text{pressure}) - \text{Port C1 pressure}}{4}$$

Internal pilot pressure, nominal at port V1 =

$$\frac{\text{Valve set pressure} + (5 \times \text{Port V2}\blacksquare\ \text{pressure}) - \text{Port C2 pressure}}{4}$$

2. For MCV4-16 models

Internal pilot pressure, nominal at port V2 =

$$\frac{\text{Valve set pressure} + (12 \times \text{Port V1}\blacksquare\ \text{pressure}) - \text{Port C1 pressure}}{11}$$

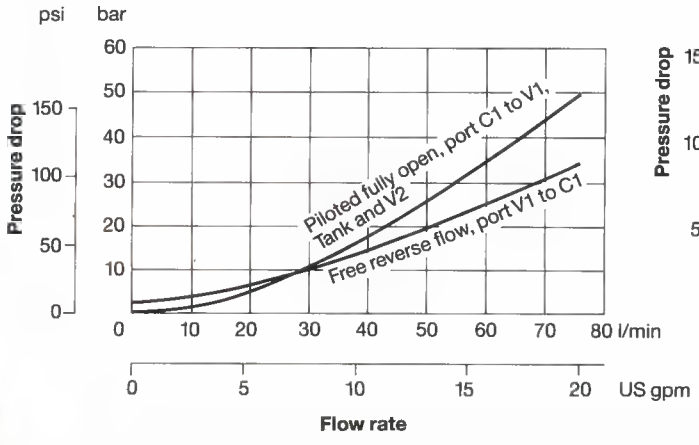
Internal pilot pressure, nominal at port V1 =

$$\frac{\text{Valve set pressure} + (12 \times \text{Port V2}\blacksquare\ \text{pressure}) - \text{Port C2 pressure}}{11}$$

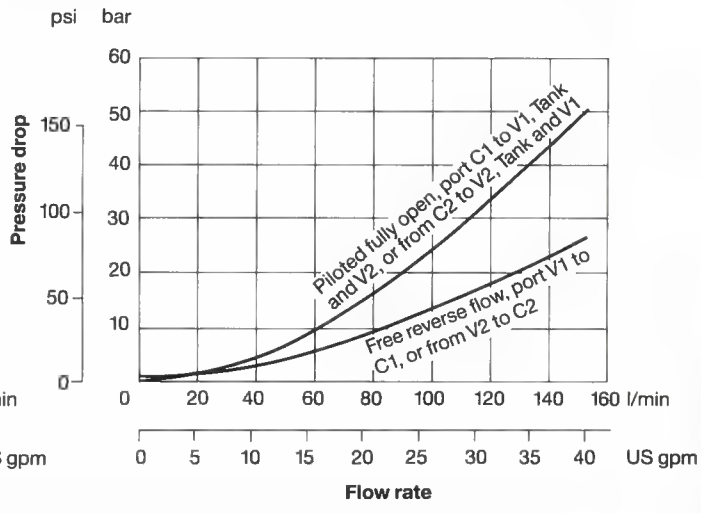
■ Or Tank port, whichever is at the lowest pressure.

Pressure drop characteristics

MCV4-10

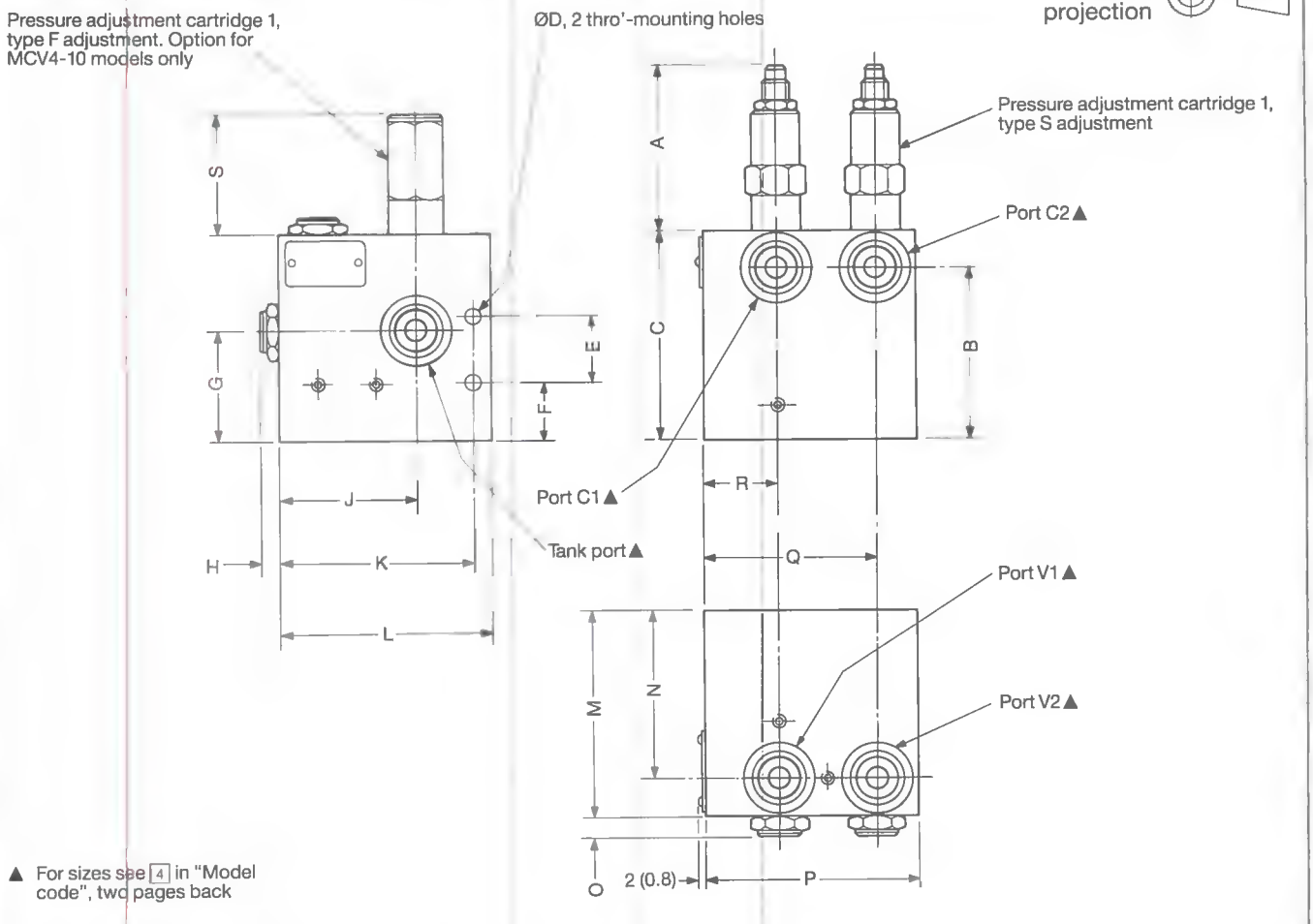


MCV4-16



Installation dimensions in mm (inches)

3rd angle projection



▲ For sizes see [4] in "Model code", two pages back

Model	A	B	C	ØD	E	F	G	H	J
MCV4-10	78,6 (3.094)	81 (3.188)	100 (3.938)	8,73 (0.344)	31,75 (1.25)	27 (1.063)	52,4 (2.063)	7,16 (0.281)	65,10 (2.563)
MCV4-16	104 (4.094)	101,60 (4.00)	127 (5.00)	13,48 (0.531)	44,45 (1.75)	25,40 (1.00)	69,85 (2.75)	12,70 (0.50)	76,20 (3.00)

Model	K	L	M	N	O	P	Q	R	S
MCV4-10	92,08 (3.625)	100 (3.938)	100 (3.938)	80,97 (3.188)	7,16 (0.281)	101,60 (4.00)	82,55 (3.25)	34,92 (1.375)	52,40 (2.063)
MCV4-16	114,30 (4.50)	127 (5.00)	127 (5.00)	101,60 (4.00)	12,70 (0.50)	127 (5.00)	101,60 (4.00)	50,80 (2.00)	—

Spare parts

The only parts available are cartridges and seal kits (comprising external seals and back-up rings)

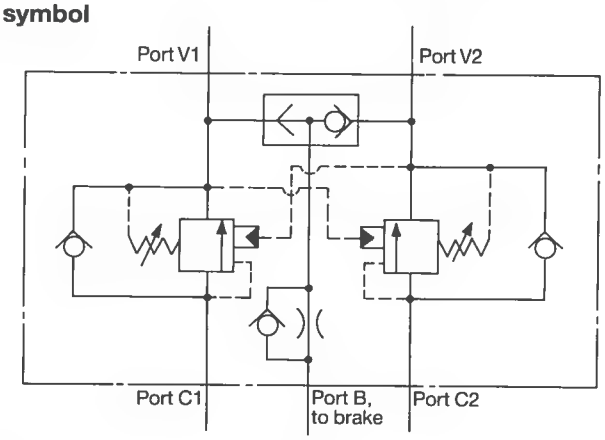
For model■	Cartridge 1□ Model	Seal kit△	Cartridge 2⬓ Model■	Seal kit△
MCV4-10-F-***-**/**	CV3-10-P-0-10	SK-10-2	RV3-10-F-0-**/**	SK-10-2
MCV4-10-S-***-**/**	CV3-10-P-0-10	SK-10-2	RV3-10-S-0-**/**	SK-10-2
MCV4-10V-F-***-**/**	CV3-10V-P-0-10	SK-10V-2	RV3-10V-F-0-**/**	SK-10V-2
MCV4-10V-S-***-**/**	CV3-10V-P-0-10	SK-10V-2	RV3-10V-S-0-**/**	SK-10V-2
MCV4-16-S-***-**/**	CV1-16-P-0-5	SK-16-2	RV3-16-S-0-**/**	SK-16-2
MCV4-16V-S-***-**/**	CV1-16V-P-0-5	SK-16V-2	RV3-16V-S-0-**/**	SK-16V-2

■ Asterisks in bold type denote the pressure adjustment range code common to the model designations of a given standard MCV4 assembly and related RV3 cartridge.
◪ Four per MCV4 valve. For details see page 171 for CV3-10 valves and page 173 for CV1-16 valves.
⬓ Two per MCV4 valve. For details, see page 84 for RV3-10 valves and page 88 for RV3-16 valves.
△ One per cartridge.

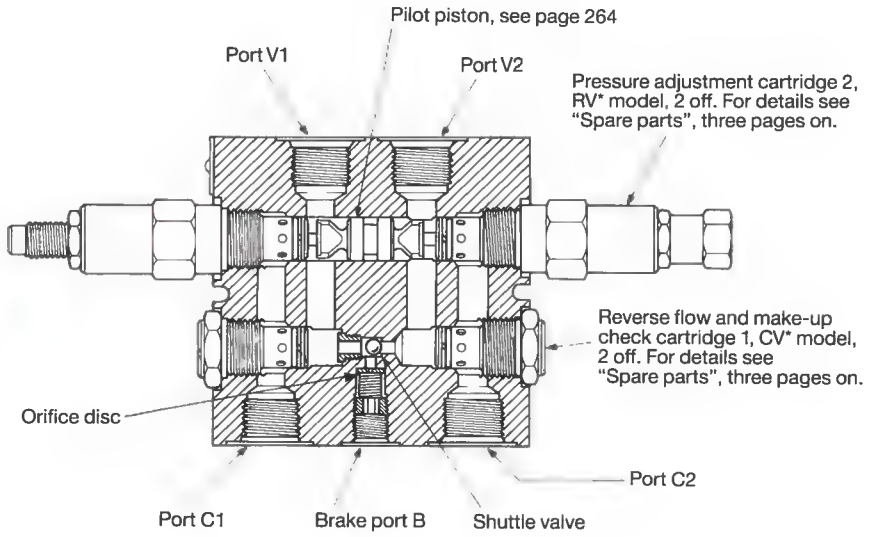
Dual counterbalance or holding valves, with reverse flow checks, cross-line piloting and brake control

MCV5-10/16

Functional symbol



Typical section



MCV5-10
Similar construction for MCV5-16

Model and ordering code

MCV5-(V)-* - * -*** - ***-**/****
1 2 3 4 5 6 7 8

1 Nominal size/rated flow
10 = 76 l/min (20 US gpm)
16 = 151 l/min (40 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Cracking pressure adjustment
S = Screw
F = Factory-set
I = Internal
C = Cap
} Options for MCV5-10 only

4 Piston seals
O = Seals omitted
A = Seals compatible with MCV5-**-* models
B = Seals compatible with MCV5-**V-* models

5 Brake release orifice diameter
Specify in thousandths of an inch (up to a maximum of 0.185") e.g.
100 = 2,54 mm (0.100")
125 = 3,17 mm (0.125")

6 Form
In light-duty housing;
207 bar (3000 psi) max.
12T = SAE 12 size main ports▲
16T = SAE 16 size main ports▲ (Option for MCV5-16 models only)
▲ Brake port is SAE 5 size

7 Cracking pressure adjustment range, ports C1 and C2, bar (psi)
MCV5-10 models
4 = 3,45-31,0 (50-450)
12 = 6,9-86,2 (100-1250)
25 = 17,2-172 (250-2500)
MCV5-16 models
13 = 3,45-89,6 (50-1300)

For higher pressure models in MCV5-10 or 16 series, consult your local sales engineer.

8 Factory-set cracking pressure, ports C1 and C2
Within ranges in 7 above.
Both RV3 cartridges set at the same pressure.
Blank = Normal factory setting; at approx. mid-range
User-requested settings in 3,45 bar (50 psi) steps, coded as in following examples:
10 = 68,9 bar (1000 psi)
10.5 = 72,4 bar (1050 psi)
Insert required code when ordering.

Operating data Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)	
Max. pressure, all ports	207 bar (3000 psi)▲
Rated flow	See [1] in "Model code" on previous page
Pilot pressure calculations	See formulae below
Pressure drop characteristics	See graphs below
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions	See next page
Mass: MCV5-10 MCV5-16	 1,95 kg (4.3 lb) approx. 4,68 kg (10.3 lb) approx.
Spare parts	See next page

▲ For higher pressure models, consult your local sales engineer

Pilot pressure calculations

1. For MCV4-10 models

Internal pilot pressure, nominal at port V2 =

$$\frac{\text{Valve set pressure} + (7{,}25 \times \text{Port V1 pressure}) - \text{Port C1 pressure}}{6{,}25}$$

Internal pilot pressure, nominal at port V1 =

$$\frac{\text{Valve set pressure} + (7{,}25 \times \text{Port V2 pressure}) - \text{Port C2 pressure}}{6{,}25}$$

2. For MCV4-16 models

Internal pilot pressure, nominal at port V2 =

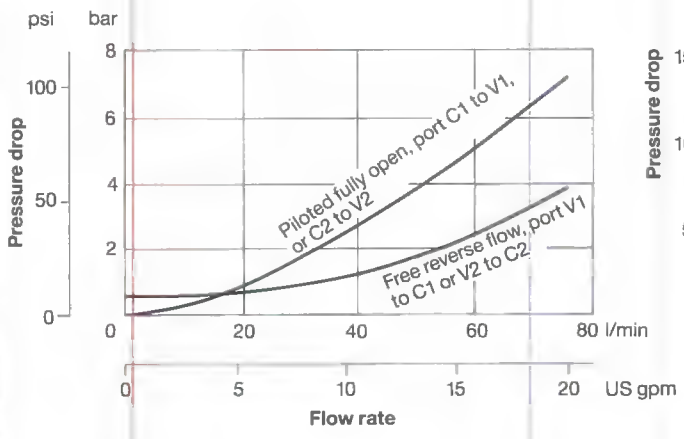
$$\frac{\text{Valve set pressure} + (12 \times \text{Port V1 pressure}) - \text{Port C1 pressure}}{11}$$

Internal pilot pressure, nominal at port V1 =

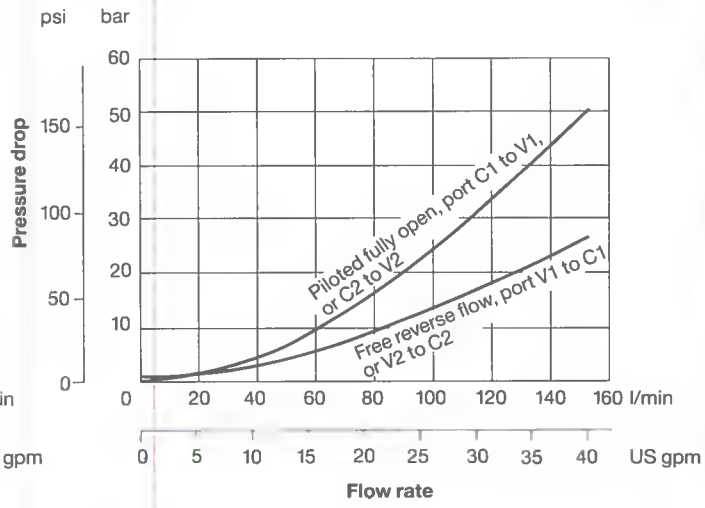
$$\frac{\text{Valve set pressure} + (12 \times \text{Port V2 pressure}) - \text{Port C2 pressure}}{11}$$

Pressure drop characteristics

MCV5-10

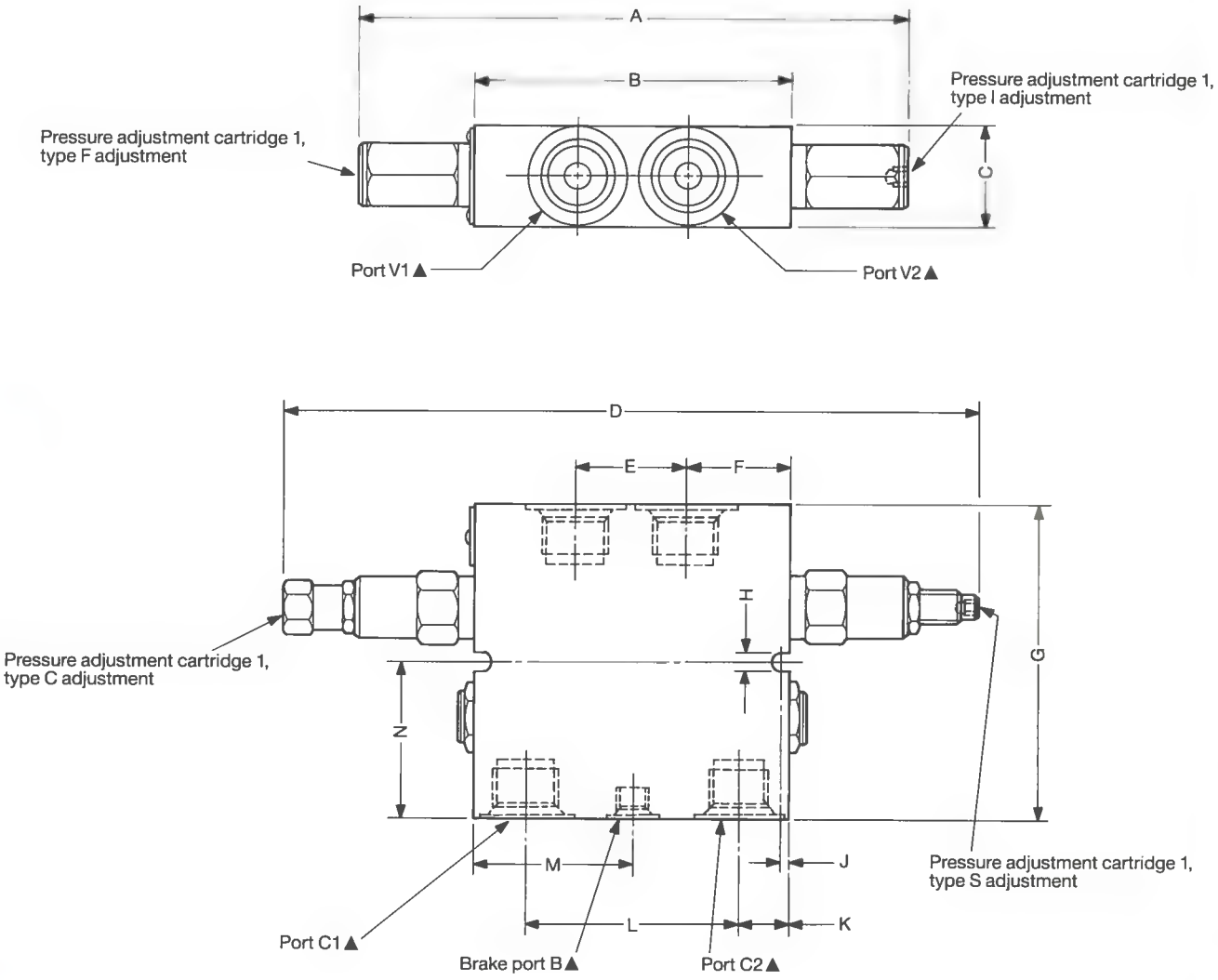


MCV5-16



Installation dimensions in mm (inches)

3rd angle projection



▲ For sizes see [6] in "Model code", two pages back

Model	A	B	C	D	E	F
MCV5-10	219 (8.625)	127 (5.00)	41,3 (1.625)	278 (10.94) max. 252 (9.94) min.	44,45 (1.75)	41,3 (1.625)
MCV5-16	N/A	178 (7.00)	51 (2.00)	410 (16.125) max. 384 (15.125) min.	63,5 (2.50)	57,2 (2.25)

Model	G	H	J	K	L	M	N
MCV5-10	127 (5.00)	7,1 (0.281)	3,2 (0.125)	20,6 (0.813)	85,7 (3.375)	63,5 (2.50)	63,5 (2.50)
MCV5-16	153 (6.00)	10,3 (0.406)	4,8 (0.188)	25,4 (1.00)	127 (5.00)	88,9 (3.50)	76,2 (3.00)

Spare parts
The only parts available are cartridges, seal kits (external seals and back-up rings) and orifice discs.

a. Cartridges and their seal kits

For model■	Cartridge 1□ Model	Seal kit▲	Cartridge 2□ Model■	Seal kit▲
MCV5-10-*-O/A-***-***-**/**	CV3-10-P-0-10	SK-10-2	RV8-10-*-0-**/**	SK-10-2
MCV5-10V-*-O/B-***-***-**/**	CV3-10V-P-0-10	SK-10V-2	RV8-10V-*-0-**/**	SK-10V-2
MCV5-16-**S**-O/A-***-***-**/**	CV1-16-P-0-5	SK-16-2	RV3-16-**S**-0-**/**	SK-16-2
MCV5-16V-**S**-O/B-***-***-**/**	CV1-16V-P-0-5	SK-16V-2	RV3-16V-**S**-0-**/**	SK-16V-2

b. Pilot piston seal kits

For model	Seal kit
MCV5-10-*-A	SK3-014
MCV5-10V-*-B	SK3-014V
MCV5-16-*-A	SK3-119
MCV5-16V-*-B	SK3-119V

c. Orifice discs — See page 262

■ Asterisks in bold type denote codes common to the model designations of a given standard MCV5 assembly and related RV* cartridge.

□ Two per MCV5 valve. For details see pages:
171 for CV3-10 cartridges
173 for CV1-16 cartridges
84 for RV8-10 cartridges
88 for RV3-16 cartridges

▲ One per cartridge.

Logic elements

These Vickers Modular cartridges provide the system designer with a most versatile range of elements for use in MCD packages for controlling pressure, flow and direction.

The range includes:

- Pressure compensators (hydrostats)
- Pressure compensators with priority and bypass outlets
- Differential-pressure controlled elements
- Pressure modulated orifice cartridges

The correct selection of these products can enhance machine performance, shorten the design process and minimize manufacturing costs of manifold blocks.

Pressure compensators (hydrostats) (PCS3)
An essential component of a pressure compensated flow control which, with an external fixed or variable orifice, provides the required compensated flow characteristic. Excess fluid upstream must be diverted e.g. through a relief to tank.

Examples:
Element – see page 233
Usage – see page 227

Pressure compensator with priority and bypass outlets (PCS4)
Similar in function to the PCS3 above but with the excess flow diverted at basically priority flow pressure, instead of at maximum system pressure as is the case with PCS3 compensators. The excess flow can pass to a secondary circuit or to tank.

Examples:
Element – see page 236
Usage – see page 228

Pressure modulated orifice cartridges (MOS1)
These cartridges are particularly effective when used with an external pressure compensator (hydrostat) such as a PCS3 or PCS4 type, the former providing normal pressure compensation and the latter providing it for priority flow arrangements.

MOS1 cartridges can also be used purely as modulated orifices.

The low pilot pressure required allows proportional control when used with an ERV2 proportional pilot relief. An example of this is the EPFR1 valve type, arranged as a pressure-compensated priority flow control in an MCD package.

Examples:
MOS1 – see page 239
EPFR1 – see page 203
Usages – see pages 227 and 228

Differential-pressure controlled elements (DPS2)
For controlling pressure, flow or direction (including 3 and 4-way bridge circuits) with the aid of external pilot operators. DPS2 elements are function building blocks which respond to pressure differential signals, providing the capacity to switch or modulate flows up to 378 l/min (100 US gpm) and pressure to 345 bar (5000 psi).

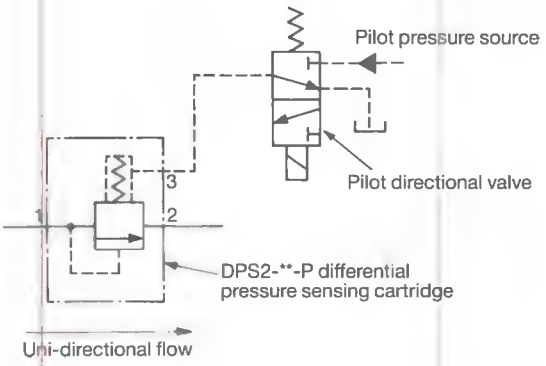
Many of the size 8 and 10 cartridges make excellent pilot operators while the choice of pilot arrangements related to DPS2 variants can minimize the number of construction holes in a manifold, thus simplifying design and reducing cost.

Examples:
Elements – see page 242
Pressure control functions – see page 226
Flow control functions – see pages 227 thro' 229
Directional control functions – see pages 230 thro' 232

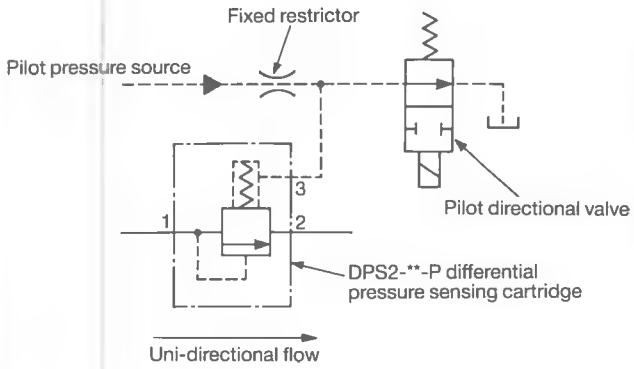
Application examples

Pressure control functions

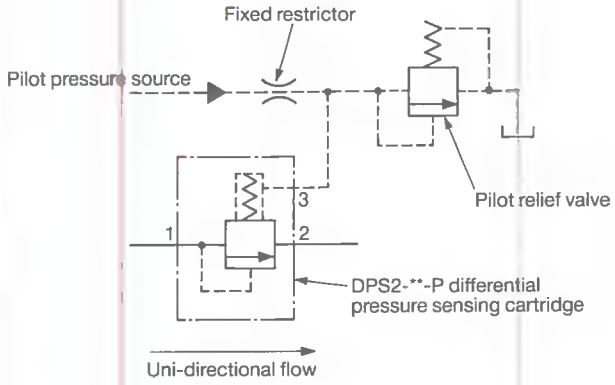
Sequence example, normally open
Switched by 3-way, 2-position pilot valve
and external pilot pressure



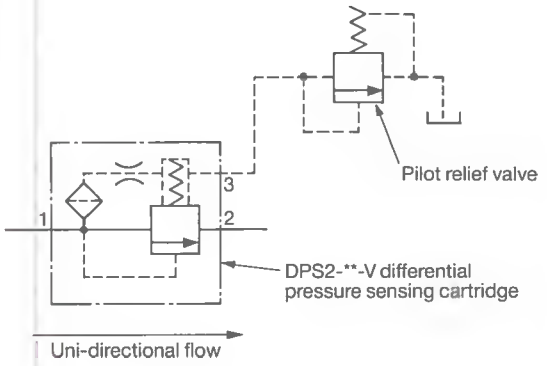
Sequence example, normally open
Switched by external pilot pressure and
vented thro' 2-way, 2-position pilot valve



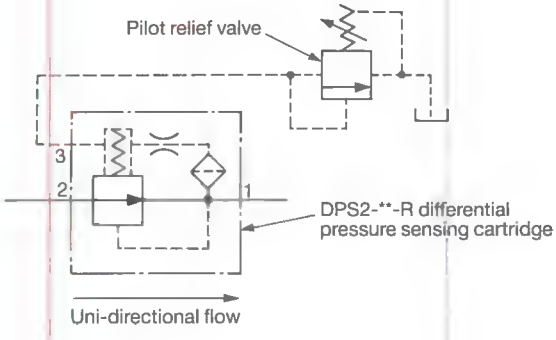
Pressure relief or sequence example
With external pilot supply and pilot relief



Pressure relief or sequence example, normally open
With internal pilot supply and switched by
2-way, 2-position pilot valve

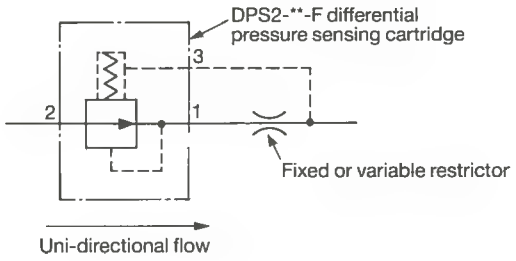


Pressure reducing example
Non-relieving type

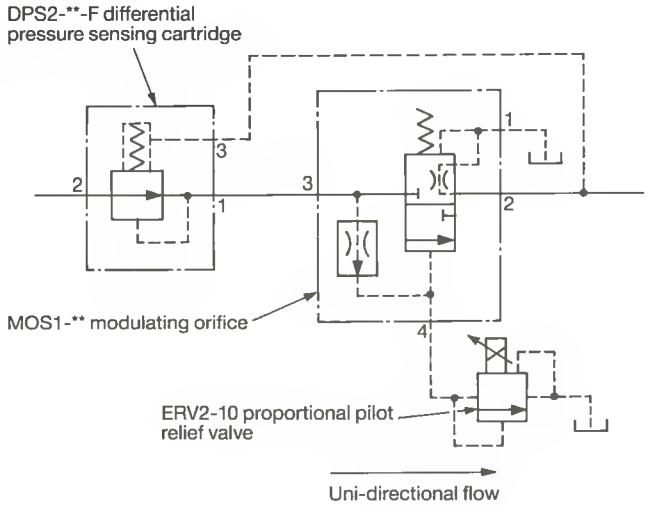


Flow control functions

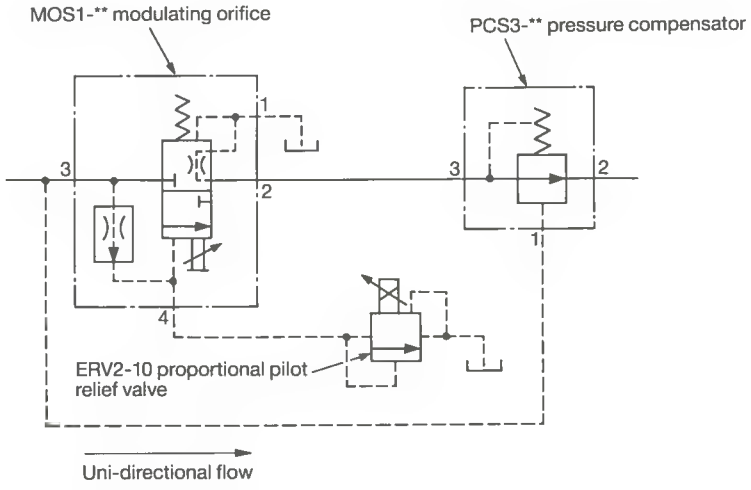
Pressure compensated flow control example
With downstream fixed or variable control



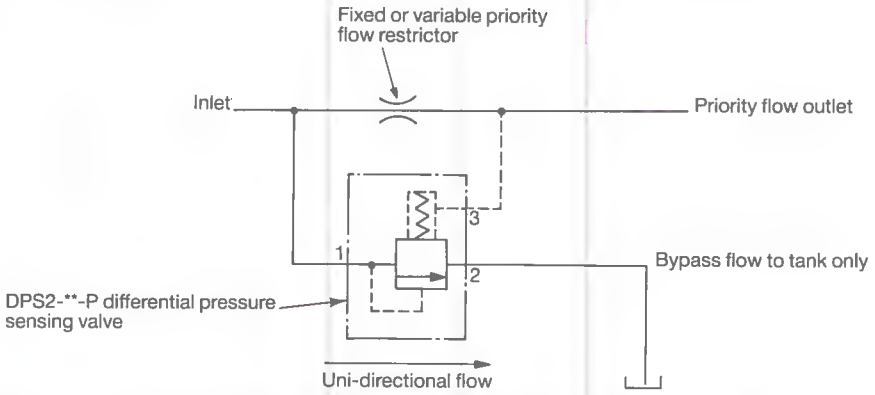
Pressure compensated flow control example
With electrohydraulic proportional control downstream



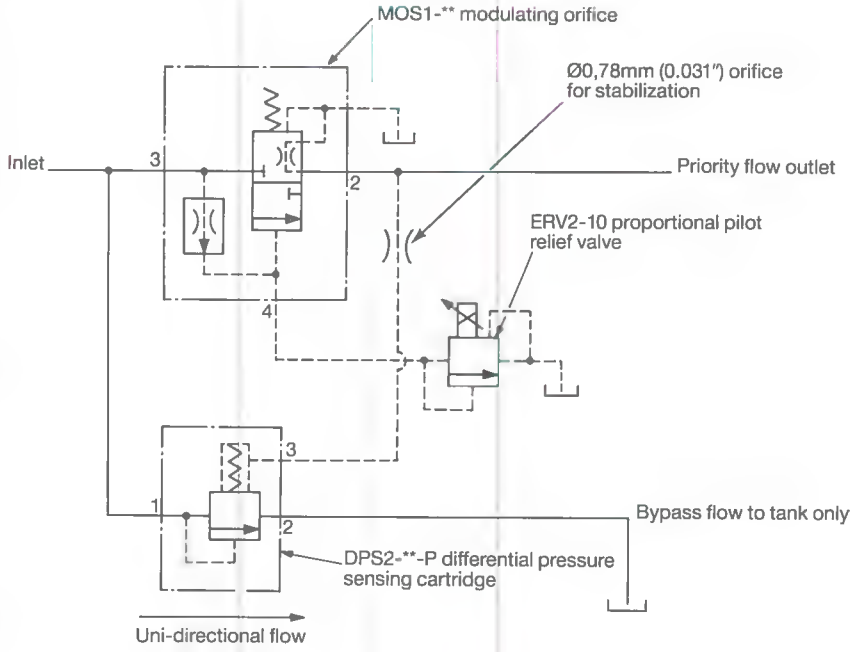
Pressure compensated flow control example
With electrohydraulic proportional control upstream



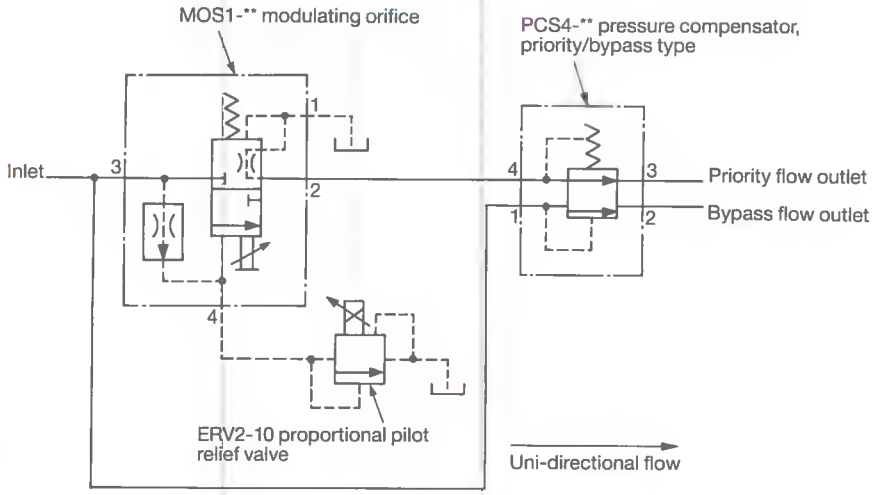
Pressure compensated priority flow control example
With fixed or variable priority flow control



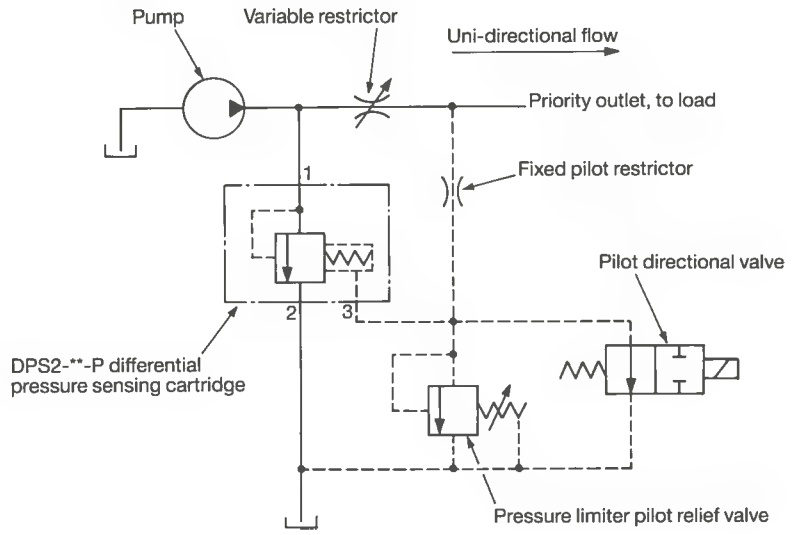
Pressure compensated priority flow control example
Form A



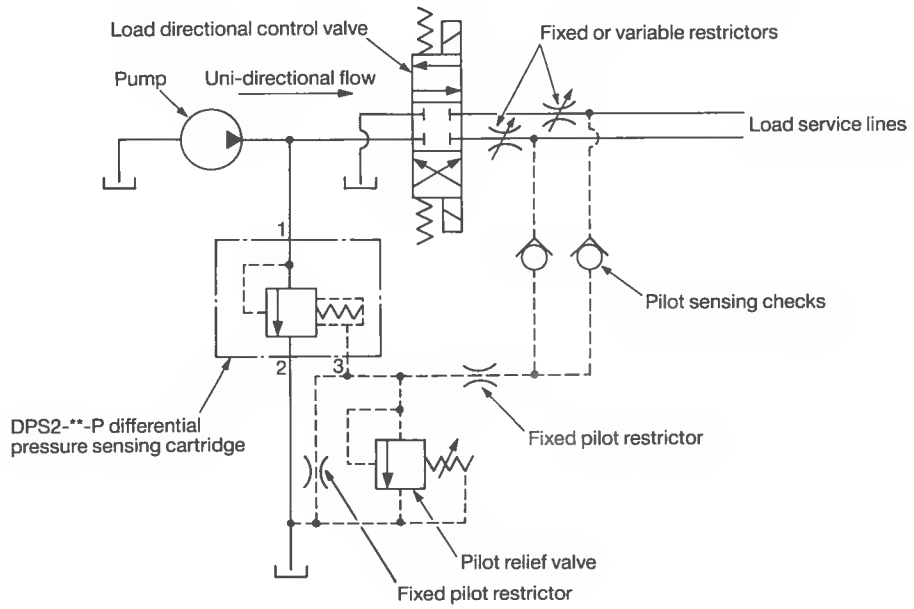
Pressure compensated priority flow control example
Form B



Load-sensing priority flow control example,
with pressure limiter and venting

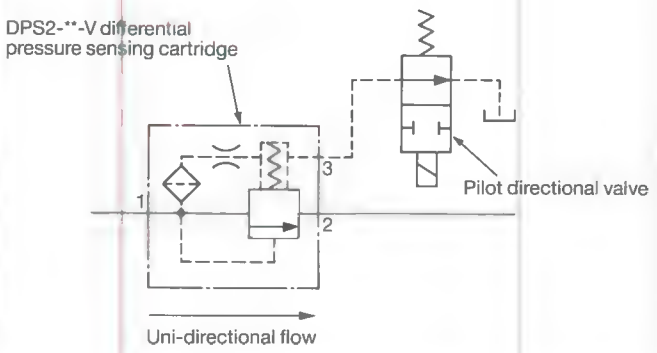


Load-sensing priority flow control example,
double acting version with pressure limiter

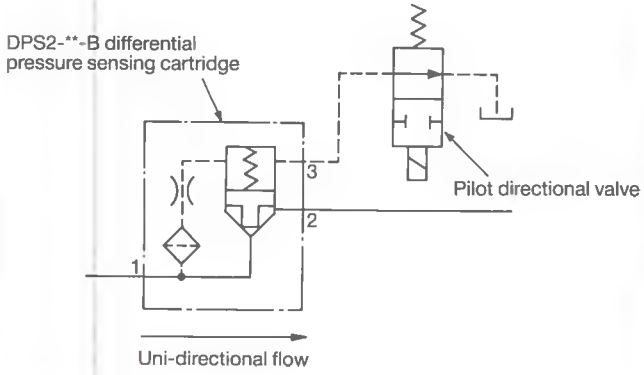


Directional control functions
Two-way, two-position, normally open examples

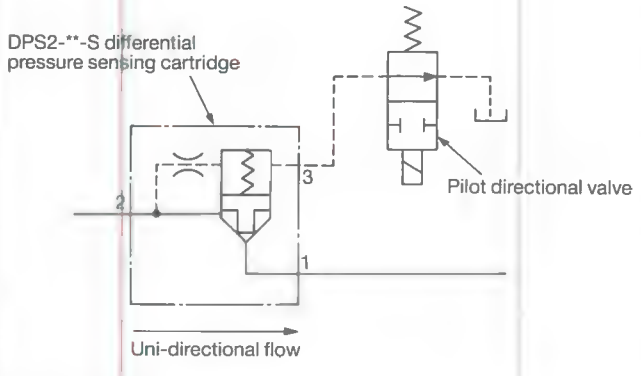
With DPS2-**-V cartridge
and internal pilot supply



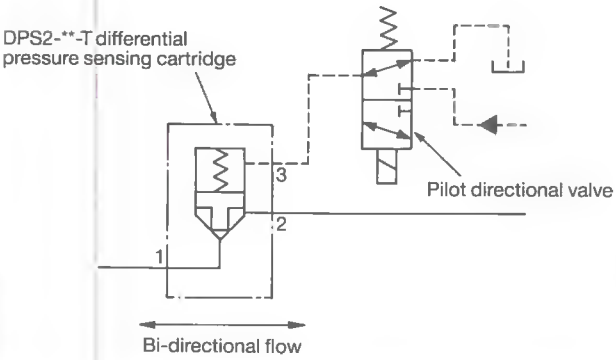
With DPS2-**-B cartridge
and internal pilot supply



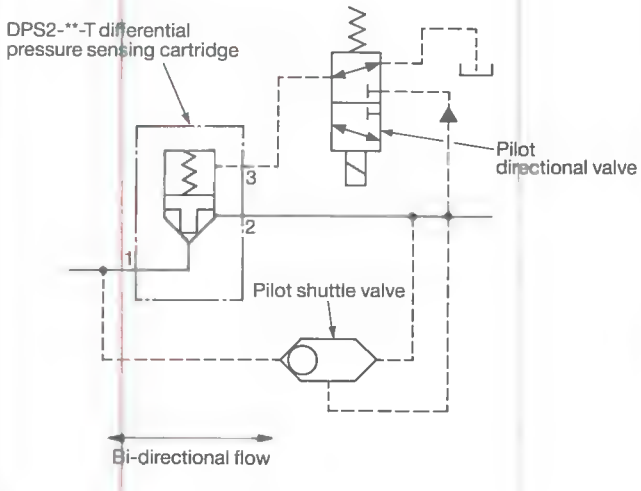
With DPS2-**-S cartridge
and internal pilot supply



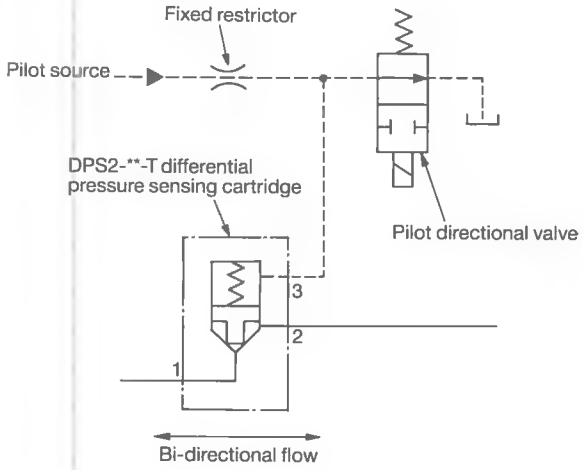
With DPS2-**-T cartridge
and external pilot supply



With DPS2-**-T cartridge
and internal shuttle-selected pilot supply



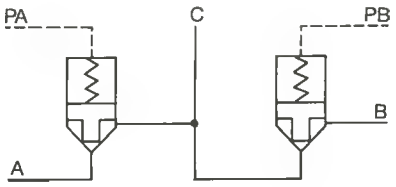
With DPS2-**-T cartridge,
external pilot supply
and two-way two-position
pilot directional valve



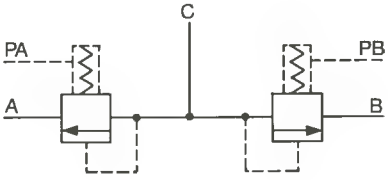
Other examples
As the two "Sequence function, normally open" examples at the top of page 226.

Three-way bridge circuits

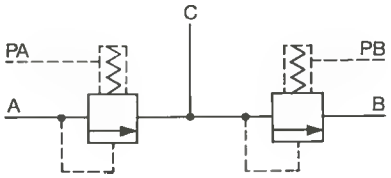
Form 1, with DPS2-**-T
differential pressure sensing cartridges



Form 2, with DPS2-**-P
differential pressure sensing cartridges



Form 3, with DPS2-**-P
differential pressure sensing cartridges



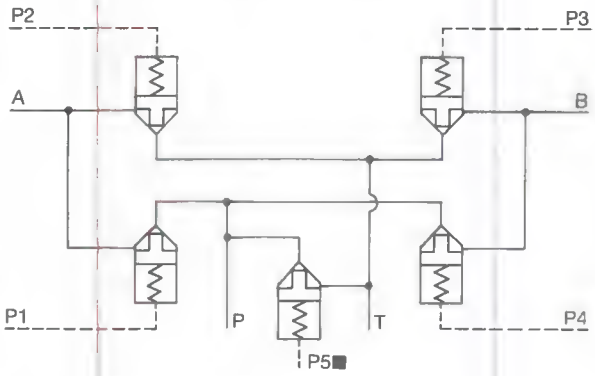
Reqd. flow path	Pilot pressure ▲ to		Available from example		
	PA	PB	1	2	3
A B C	0	0	Yes	Yes	No
	1	0	Yes	Yes	Yes
	0	1	Yes	Yes	No
	0	1	Yes	No	Yes

▲ 1 = Pressure applied
0 = Pressure vented

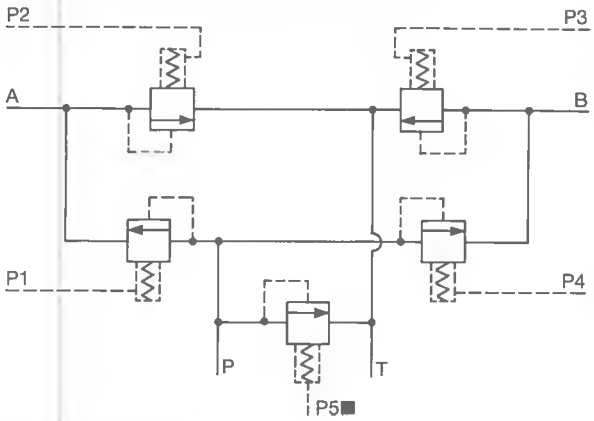
Note: Pilot pressure, modified by valve area ratio (if any), must exceed load pressure at valve in order to close valve.

Four-way bridge circuits

With DPS2-**-T
differential pressure sensing cartridges



With DPS2-**-P
differential pressure sensing cartridges



Reqd. flow path	Pilot pressure ▲ to P1	P2	P3	P4	P5■
A B / P T	1	1	1	1	1
	0	0	0	0	0
	1	1	0	0	0
	0	0	1	1	0
■	1	1	1	1	0
	1	0	0	1	1
	0	1	1	0	1
	1	1	0	1	1
	0	1	1	1	1
	0	1	0	1	1
	1	0	1	0	1
	1	1	1	0	1
	1	0	1	1	1

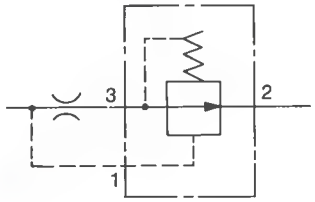
■ P5 cartridge essential if the following flow path is to be used: A B / P T

▲ 1 = Pressure applied
0 = Pressure vented

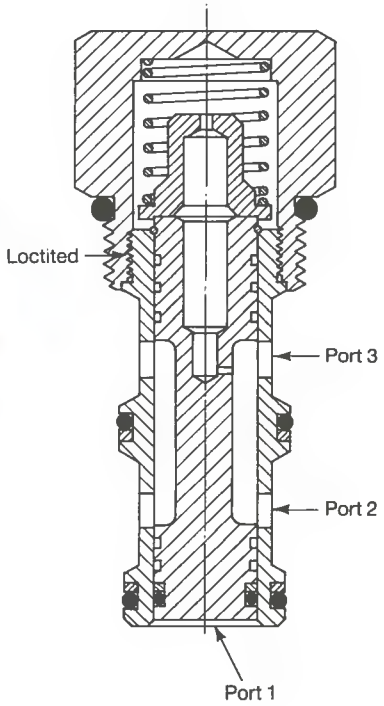
Pressure compensators (hydrostats), two-way series

PCS3-10/16/20

Functional symbol



Typical section



PCS3-10
Similar construction for PCS3-16 and PCS3-20

Model and ordering code

PCS3-(V)-0 * -*****
1 2 3 4

1 Nominal size/rated flow
10 = 38 l/min (10 US gpm)
16 = 114 l/min (30 US gpm)
20 = 189 l/min (50 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Form
Blank = No seal on spool
S = Seal on spool. For load holding applications where leakage from port 1 to 2 could cause cylinder drift. Use of seal will increase hysteresis.

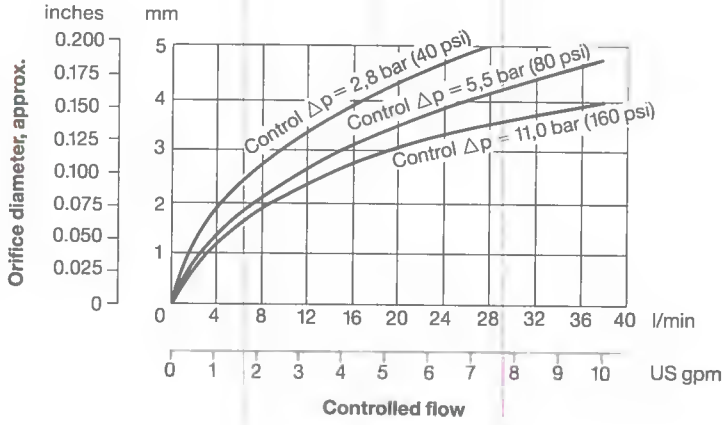
4 Pressure differential, nominal
40 = 2,8 bar (40 psi)
80 = 5,5 bar (80 psi)
160 = 11,0 bar (160 psi). Not available with PCS3-20.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

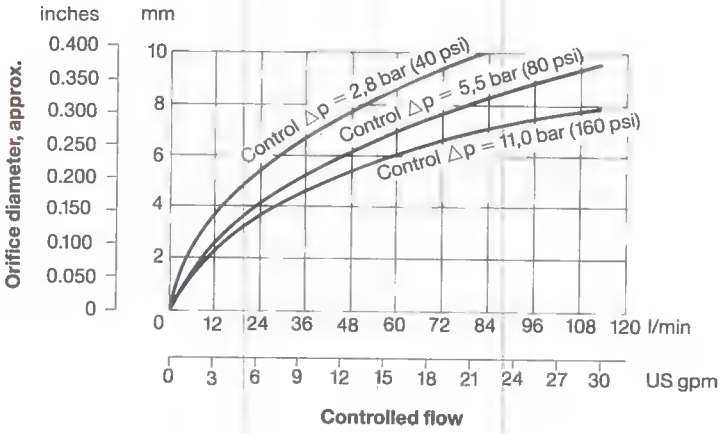
Usage	To provide pressure compensation of flow when close-coupled in series with a fixed or variable external orifice. Customized housings are necessary for close-coupling the hydrostat and orifice.
Max. pressure, all ports	207 bar (3000 psi)
Rated flow	See 1 in "Model code" above
Performance characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" and also page 266
Installation dimensions, cartridge only	See two pages on
Cavity size: PCS3-10 PCS3-16 PCS3-20	 C-10-3 C-16-3 C-20-3 For dimensions see page 247
Mass, cartridge only: PCS3-10 PCS3-16 PCS3-20	 0,12 kg (0.26 lb) approx. 0,38 kg (0.84 lb) approx. 0,88 kg (1.94 lb) approx.
Spare parts	See two pages on

Performance characteristics
Cartridges only

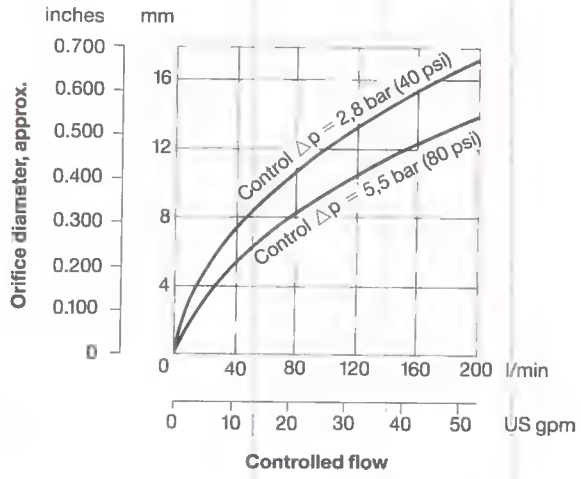
PCS3-10



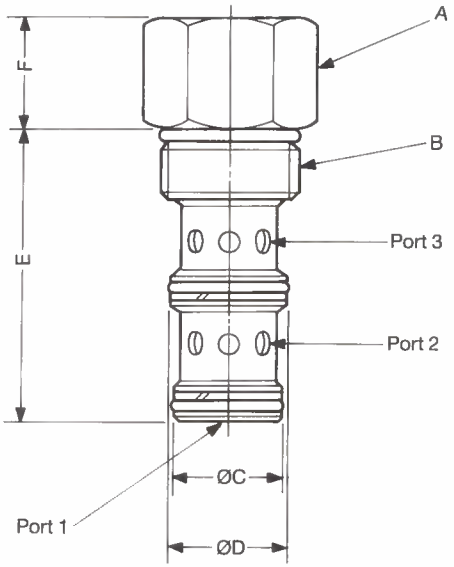
PCS3-16



PCS3-20



Installation dimensions in mm (inches)



Model	A	B	ØC	ØD	E	F
PCS3-10	25,4 (1.0) A/F hex. Torque 47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)	46 (1.812)	19 (0.75)
PCS3-16	38,1 (1.5) A/F hex. Torque 108-122 Nm (80-90 lbf ft)	1.3125″-12 UN	26,95 (1.061) 26,90 (1.059)	28,55 (1.124) 28,50 (1.122)	73 (2.875)	28,6 (1.125)
PCS3-20	47,6 (1.875) A/F hex. Torque 129-156 Nm (95-115 lbf ft)	1.625″-12 UN	33,30 (1.311) 33,22 (1.308)	36,47 (1.436) 36,40 (1.433)	98,4 (3.875)	41,3 (1.625)

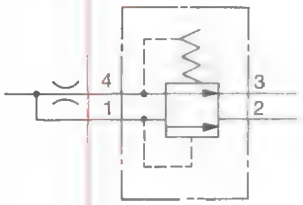
Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:	Kit no.
PCS3-10-0*	SK-10-3
PCS3-10V-0*	SK-10V-3
PCS3-16-0*	SK-16-3
PCS3-16V-0*	SK-16V-3
PCS3-20-0*	SK-20-3
PCS3-20V-0*	SK-20V-3

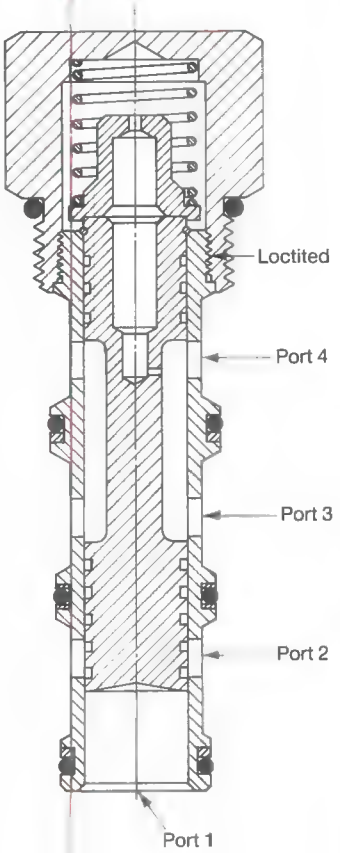
Pressure compensators (hydrostats), three-way, priority (bypass) series

PCS4-10/16/20

Functional symbol



Typical section



PCS4-10
Similar construction for PCS4-16 and PCS4-20

Model and ordering code

PCS4-(V)-0- *****
[1] [2] [3]

[1] Nominal size/rated input flow
10 = 57 l/min (15 US gpm)
16 = 151 l/min (40 US gpm)
20 = 265 l/min (70 US gpm)

[2] Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

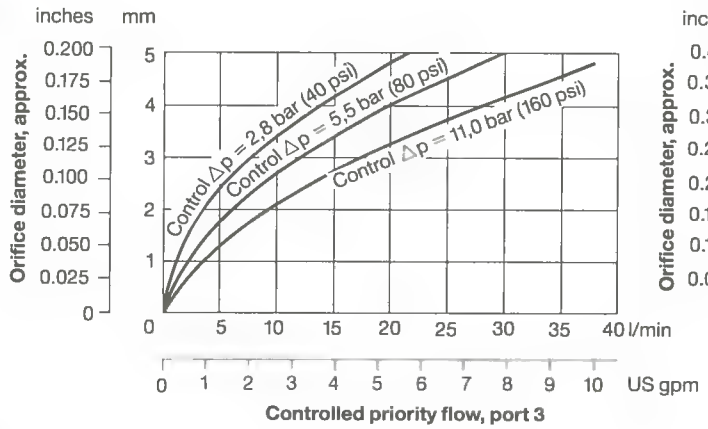
[3] Pressure differential, nominal
40 = 2,8 bar (40 psi)
80 = 5,5 bar (80 psi)
160 = 11,0 bar (160 psi). Not available with PCS4-20.

Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

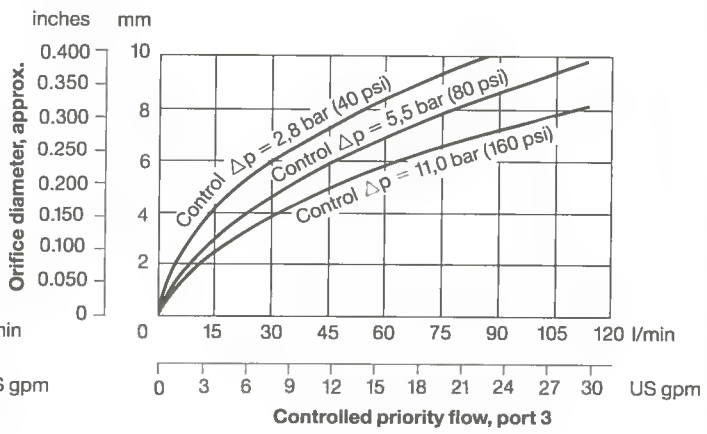
Usage	To provide pressure compensation of priority flow (from port 3) while excess input flow is diverted via port 1 to 2. Priority flow rate is controlled by a fixed or variable external orifice close-coupled in series with port 4. A customized housing is necessary for close-coupling the orifice and hydrostat.
Max. pressure	207 bar (3000 psi)
Rated input flow (priority plus excess)	See [1] in "Model code" above
Max. controlled flow: PCS4-10 PCS4-16 PCS4-20	 38 l/min (10 US gpm) 114 l/min (30 US gpm) 189 l/min (50 US gpm)
Performance characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" above, and also page 266
Installation dimensions, cartridge only	See two pages on
Cavity size: PCS4-10 PCS4-16 PCS4-20	 C-10-4 C-16-4 C-20-4 For dimensions see page 247
Mass, cartridge only: PCS4-10 PCS4-16 PCS4-20	 0,14 kg (0.32 lb) approx. 0,50 kg (1.12 lb) approx. 1,0 kg (2.22 lb) approx.
Spare parts	See two pages on

Performance characteristics
Cartridges only

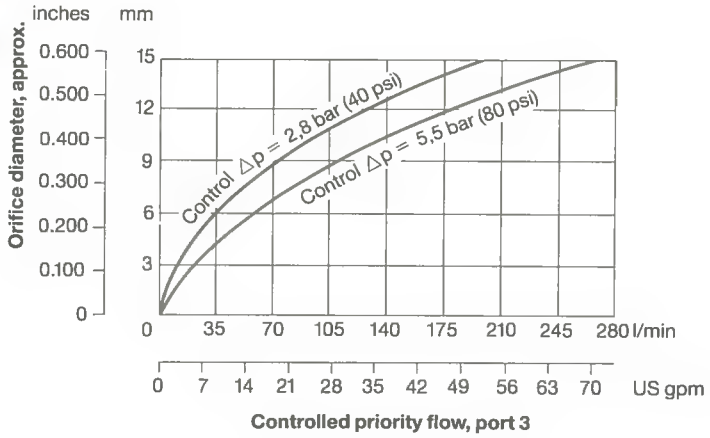
PCS4-10



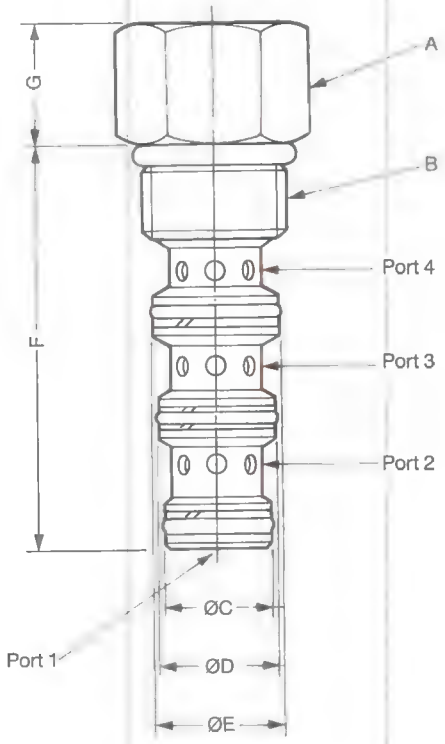
PCS4-16



PCS4-20



Installation dimensions in mm (inches)



Model	A	B	ØC	ØD	ØE	F	G
PCS4-10	25,4 (1.0) A/F hex. Torque 47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	15,80 (0.622) 15,75 (0.620)	17,40 (0.685) 17,35 (0.683)	18,97 (0.747) 18,92 (0.745)	61,93 (2.438)	19 (0.75)
PCS4-16	38,1 (1.5) A/F hex. Torque 108-122 Nm (80-90 lbf ft)	1.3125″-12 UN	25,37 (0.999) 25,32 (0.997)	26,95 (1.061) 26,90 (1.059)	28,55 (1.124) 28,50 (1.122)	101,6 (4.00)	28,6 (1.125)
PCS4-20	47,6 (1.875) A/F hex. Torque 129-156 Nm (95-115 lbf ft)	1.625″-12 UN	31,70 (1.248) 31,62 (1.245)	33,30 (1.311) 33,22 (1.308)	36,47 (1.436) 36,40 (1.433)	139,7 (5.50)	41,3 (1.625)

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

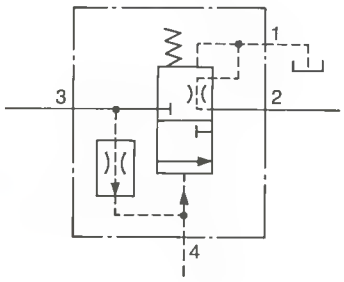
	Kit no.
PCS4-10-0	SK3-10-4
PCS4-10V-0	SK3-10V-4
PCS4-16-0	SK3-16-4
PCS4-16V-0	SK3-16V-4
PCS4-20-0	SK3-20-4
PCS4-20V-0	SK3-20V-4

Modulating orifice cartridges, pilot operated series

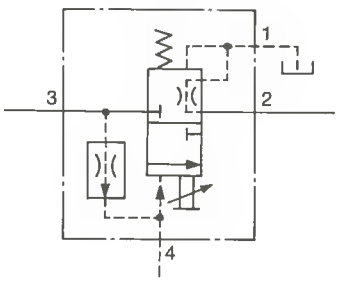
MOS1-10/16

Functional symbols

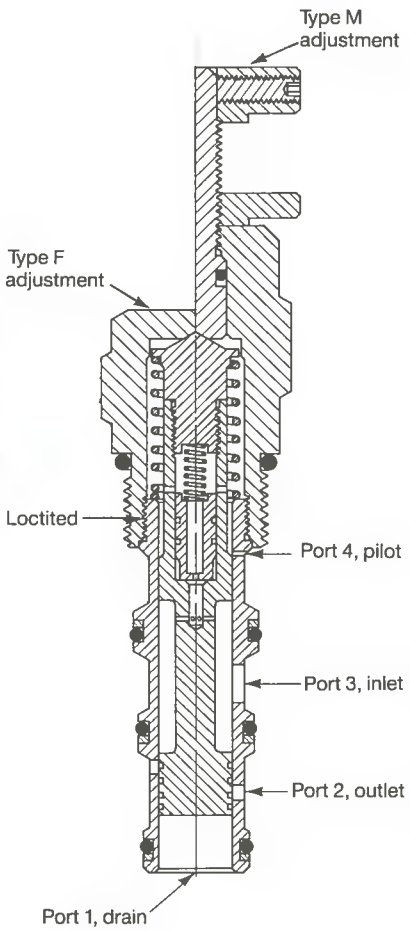
MOS1-**(V)-F



MOS1-**(V)-M



Typical section



MOS1-10
Similar construction for MOS1-16

Model and ordering code

MOS1-(V)- * -0-****
1 2 3 4

1 **Nominal size**
10 or 16; see also 4 below

2 **Fluid compatibility**
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 **Spring-offset spool position adjustment**
F = Fixed
M = Manual override

4 **Controlled flow range, port 3 to 2**
10 = 0-38 l/min (0-10 US gpm) for MOS1-10 models
35 = 0-132 l/min (0-35 US gpm) for MOS1-16 models

Operating data

Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

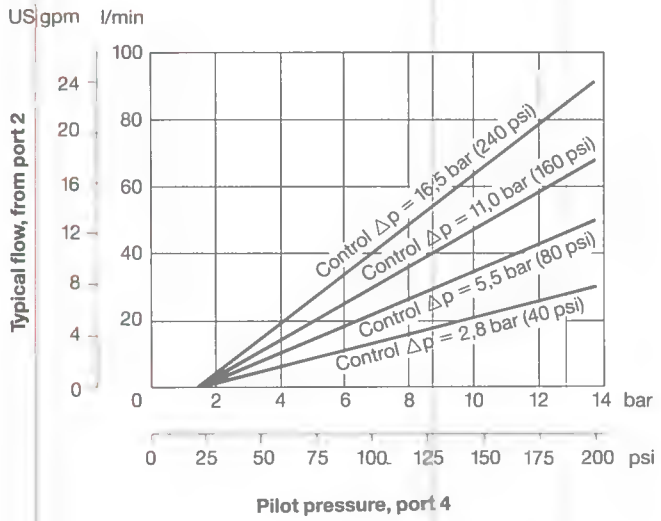
Usage	To modulate flow from port 3 to 2 proportional to a back pressure applied to pilot port 4. When used in series with a PCS3 or PCS4 pressure compensator (see pages 233 and 236 respectively), and a suitable back-pressure pilot valve connected to port 4, modulated flow is pressure compensated. The essential close-coupling with a pressure compensator necessitates a customized housing to accommodate both cartridges.
Max. pressure, all ports	207 bar (3000 psi)
Controlled flow range	See 4 in "Model code" above
Pilot pressure adjustment range	1,38-13,79 bar (20-200 psi)
Rated pilot flow, from port 4	1,13 l/min (0.3 US gpm)
Performance characteristics	See graphs on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See 2 in "Model code" above, and also page 266
Installation dimensions, cartridge only	See two pages on
Cavity size: MOS1-10 MOS1-16	 C-10-4 C-16-4 For dimensions see page 247

Continued on next page

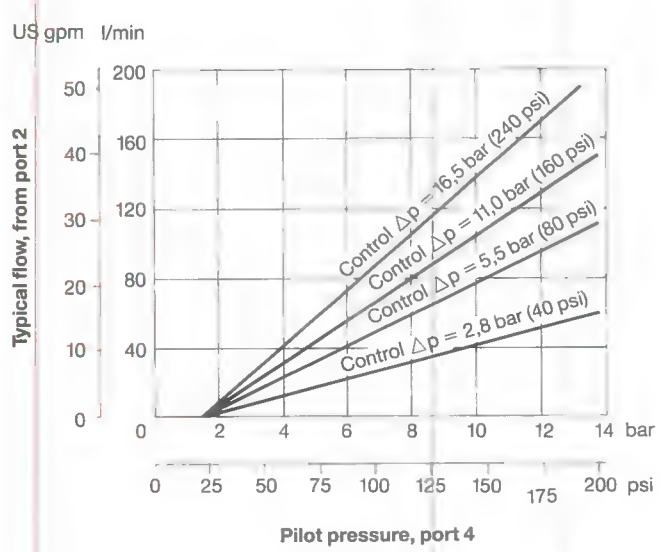
Mass, cartridge only:	
MOS1-10	0,15 kg (0.32 lb) approx.
MOS1-16	0,52 kg (1.14 lb) approx.
Spare parts	See next page

Performance characteristics
Cartridges only

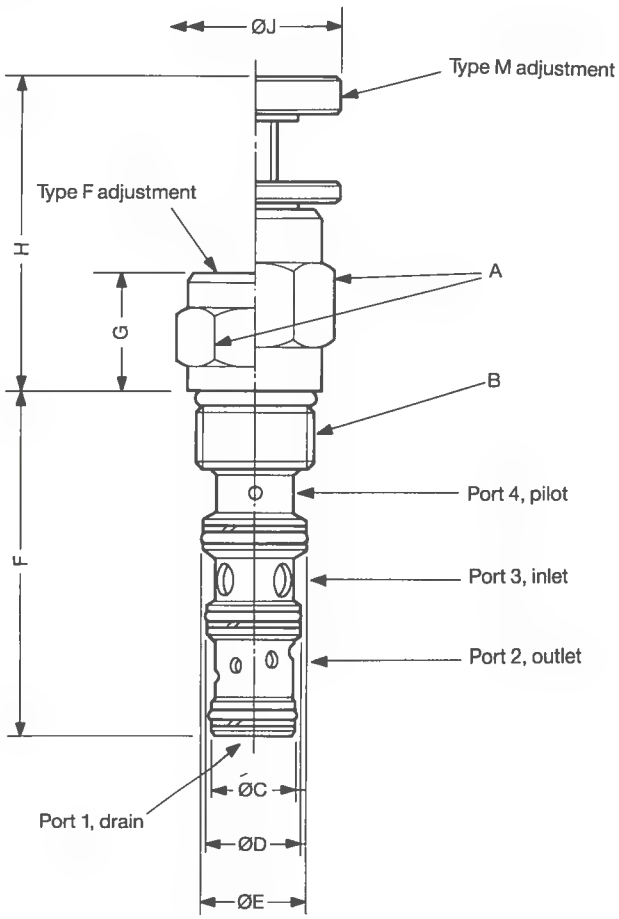
MOS1-10



MOS1-16



Installation dimensions in mm (inches)



Model	A	B	ØC	ØD
MOS1-10	25,4 (1.0) A/F hex. Torque 47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	15,82 (0.623) 15,77 (0.621)	17,42 (0.686) 17,37 (0.684)
MOS1-16	38,1 (1.5) A/F hex. Torque 108-122 Nm (80-90 lbf ft)	1.3125″-12 UN	25,37 (0.999) 25,32 (0.997)	26,95 (1.061) 26,90 (1.059)

Model	ØE	F	G	H	ØJ
MOS1-10	19,00 (0.748) 18,95 (0.746)	61,9 (2.437)	22,2 (0.875)	57,2 (2.25)	31,75 (1.25)
MOS1-16	28,55 (1.124) 28,50 (1.122)	101,5 (3.997)	38 (1.50)	105 (4.125)	38,1 (1.50)

Spare parts

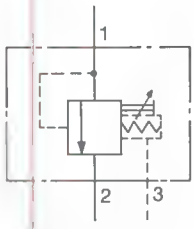
The only parts available are seal kits comprising external seals and back-up rings for:

	Kit no.
MOS1-10-*	SK-10-4
MOS1-10V-*	SK-10V-4
MOS1-16-*	SK2-16-4
MOS1-16V-*	SK2-16V-4

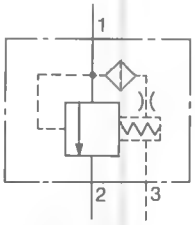
Differential pressure sensing valves

DPS2-10/16/20

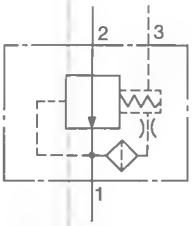
Functional symbols



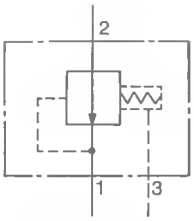
DPS2-**(V)-P-S



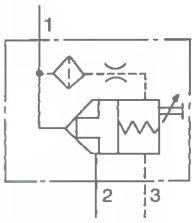
DPS2-**(V)-V-F



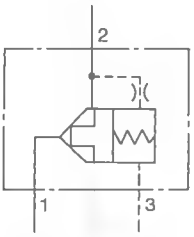
DPS2-**(V)-R-F



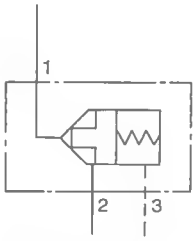
DPS2-**(V)-F-F



DPS2-**(V)-B-S

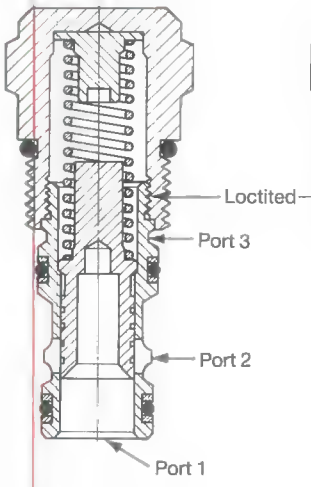


DPS2-**(V)-S-F

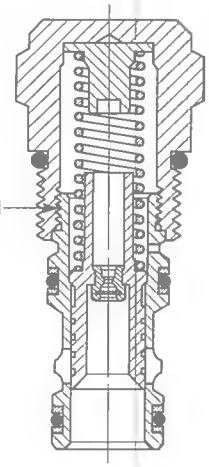


DPS2-**(V)-T-F

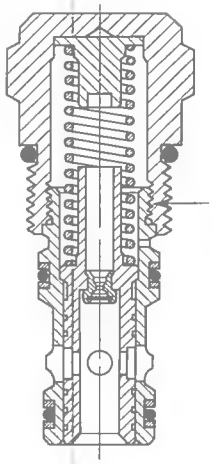
Typical sections



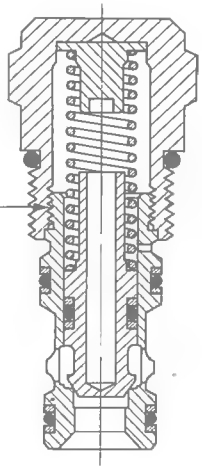
DPS2-10(V)-P-F



DPS2-10(V)-V-F



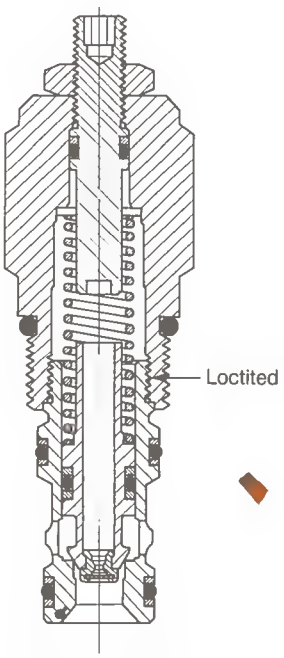
DPS2-10(V)-R-F



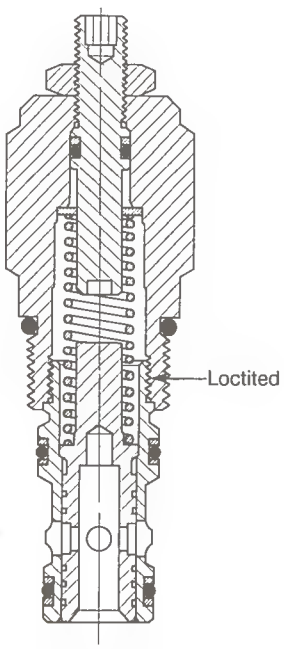
DPS2-10(V)-T-F

Similar construction for DPS2-16 and DPS2-20 models

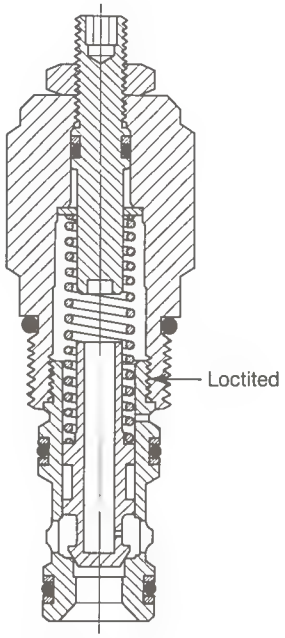
Continued on next page



DPS2-10(V)-B-S



DPS2-10(V)-F-S



DPS2-10(V)-S-S

Similar construction for DPS2-16 and DPS2-20 models

Model and ordering code

DPS2-(V)- * - * -*** - *****

1 2 3 4 5 6

1 Nominal size/rated flow
10 = 57 l/min (15 US gpm)
16 = 189 l/min (50 US gpm)
20 = 303 l/min (80 US gpm)

2 Fluid compatibility
Blank = Antiwear hydraulic oil
V = As above or with phosphate-ester (not alkyl type)

3 Spool type
See "Functional symbols" section on previous page for full details
P = Spool; normally closed
V = Spool; normally closed
R = Spool; pressure reducing, normally open
F = Spool; flow control, normally open
B = Poppet; vent to open, normally closed
S = Poppet; vent to open, normally closed
T = Poppet; bi-directional pilot to close, 2:1 ratio, normally closed

4 Stroke adjustment
F = Fixed stroke
S = Screw adjustment

5 Form
0 = Cartridge only

Code	Port sizes Ports 1 & 2	Port 3	For
In light-duty housing; 207 bar (3000 psi) max.			
6T	= SAE 6	SAE 4	DPS2-10
12T	= SAE 12	SAE 6	DPS2-16
16T	= SAE 16	SAE 6	DPS2-20
In NFPA fatigue-rated housing; 207 bar (3000 psi)			
6H	= SAE 6	SAE 6	DPS2-10
8H	= SAE 8	SAE 6	DPS2-10
2G	= G¼" (BSPF)	G¼" (BSPF)	DPS2-10
3G	= G⅜" (BSPF)	G¼" (BSPF)	DPS2-10
10H	= SAE 10	SAE 6	DPS2-16
12H	= SAE 12	SAE 6	DPS2-16
4G	= G½" (BSPF)	G⅜" (BSPF)	DPS2-16
6G	= G¾" (BSPF)	G⅜" (BSPF)	DPS2-16
12H	= SAE 12	SAE 6	DPS2-20
16H	= SAE 16	SAE 6	DPS2-20
6G	= G¾" (BSPF)	G⅜" (BSPF)	DPS2-20
8G	= G1" (BSPF)	G⅜" (BSPF)	DPS2-20

6 Differential pressure, nominal
5 = 0,35 bar (5 psi)▲
10 = 0,69 bar (10 psi)▲
Option for DPS2-10 and 20 models only
20 = 1,4 bar (20 psi)▲
40 = 2,8 bar (40 psi)
80 = 5,5 bar (80 psi), standard
160 = 11,0 bar (160 psi)
▲ The operating back-pressure at port 3 should never be less than 1.5 x the spring-set pressure

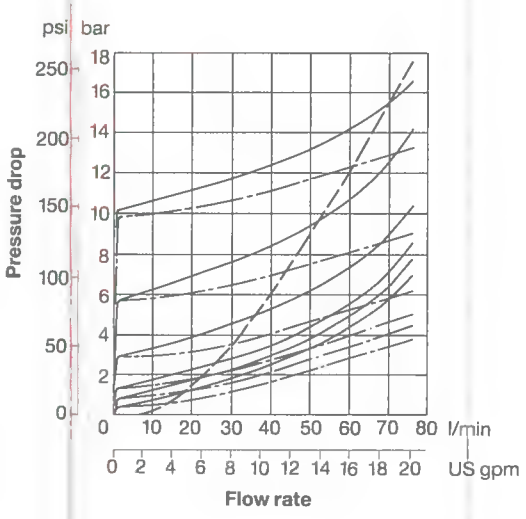
Operating data
Performance data is typical with fluid at 28 cSt (132 SUS) and 38°C (100°F)

Usage	To sense differential pressures in a system while using them to open or close a flow path between ports 1 and 2 of a DPS2 cartridge. Dependent on the model, either port 1 or 2 senses one pressure while port 3 senses the other. For examples of use see pages 226 thro' 232.
Max. pressure, all ports:	
Cartridge only	345 bar (5000 psi)
In standard housings, see below	207 bar (3000 psi)
Rated flow	See [1] in "Model code" on previous page
Performance characteristics	See graphs below and on next page
Hydraulic fluids, temperature ranges and filtration recommendations	See [2] in "Model code" on previous page, and also page 266
Installation dimensions, cartridge only	See next page
Cavity size for:	
DPS2-10	C-10-3S
DPS2-16	C-16-3S
DPS2-20	C-20-3S For dimensions see page 247
Mass, cartridge only:	
DPS2-10	0,14 kg (0.30 lb) approx.
DPS2-16	0,35 kg (0.78 lb) approx.
DPS2-20	0,81 kg (1.78 lb) approx.
Housing options:	
Standard light-duty type	See page 256
Standard fatigue-rated type	See page 252
Customized types	Consult your local sales engineer
Spare parts	See next page

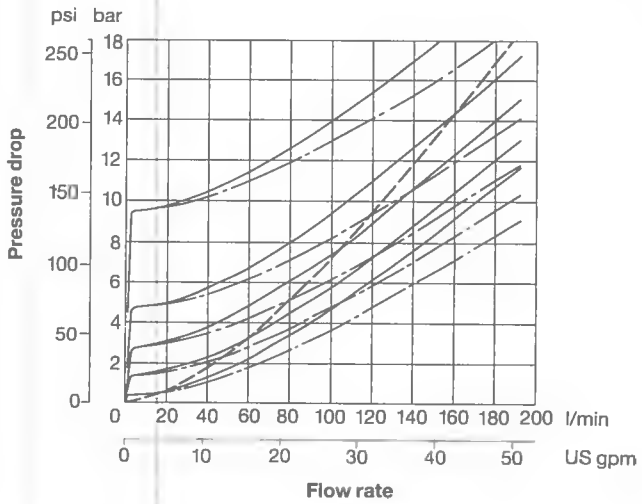
Pressure drop characteristics
Cartridges only

Legend:
——— DPS2-**(V)-B/S/T models
—·—·— DPS2-**(V)-P/V models
– – – – DPS2-**(V)-F/R models

DPS2-10



DPS2-16



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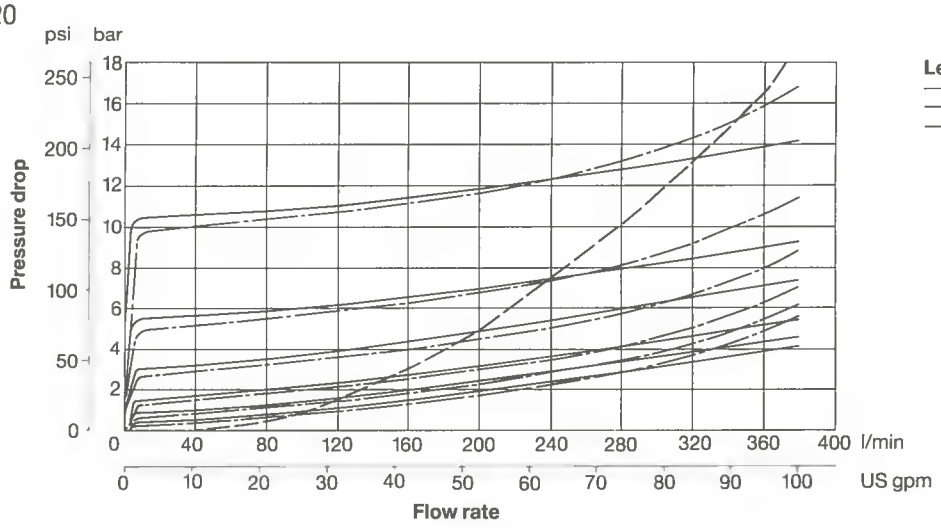
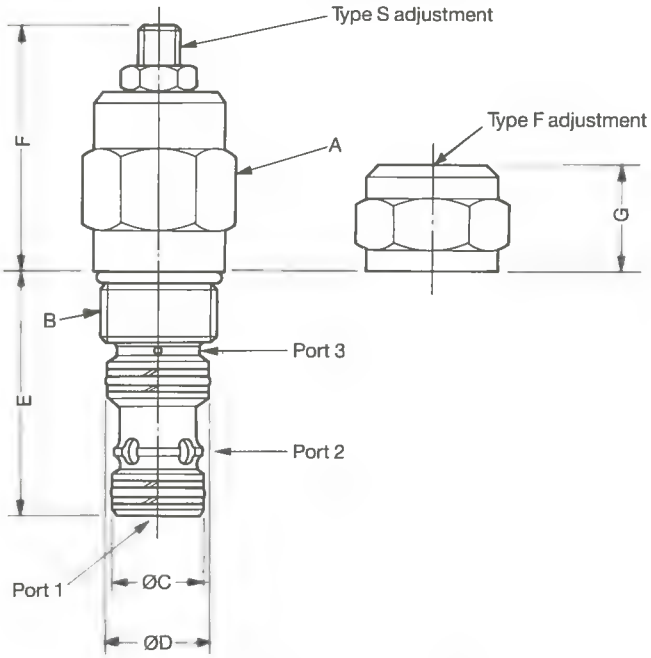
DPS2-20



Installation dimensions in mm (inches)



Model	A	B	ØC	ØD	E	F	G
DPS2-10	25,4 (1.0) A/F hex. Torque 47-54 Nm (35-40 lbf ft)	0.875″-14 UNF	17,45 (0.687) 17,40 (0.685)	19,02 (0.749) 18,97 (0.747)	47,25 (1.860)	48 (1.89)	21 (0.827)
DPS2-16	38,1 (1.5) A/F hex. Torque 108-122 Nm (80-90 lbf ft)	1.3125″-12 UN	25,37 (0.999) 25,32 (0.997)	28,55 (1.124) 28,50 (1.122)	55,58 (2.188)	56 (2.2)	27 (1.063)
DPS2-20	47,6 (1.875) A/F hex. Torque 129-156 Nm (95-115 lbf ft)	1.625″-12 UN	33,30 (1.311) 33,25 (1.309)	36,47 (1.436) 36,42 (1.434)	76,2 (3.00)	62 (2.44)	29 (1.142)

Spare parts

The only parts available are seal kits comprising external seals and back-up rings for:

	Kit no.
DPS2-10-*	SK3-10-3S
DPS2-10V-*	SK3-10V-3S
DPS2-16-*	SK3-16-3S
DPS2-16V-*	SK3-16V-3S
DPS2-20-*	SK3-20-3S
DPS2-20V-*	SK3-20V-3S

Supporting products and information

Every cartridge in this catalog is designed to fit into an appropriate cavity selected from the range of standard cavities, fully dimensioned on the next three pages.

Cavity bores can be machined accurately in aluminium, steel or cast iron with the aid of Vickers Modular roughing and finishing tools shown on page 250. The necessary UNF, or UN, threads can be machined using standard small tools, possibly already in your own tool stores or obtainable from local tool suppliers. For in-depth advice on the machining of cavities, consult your local sales engineer.

Simple or prototype systems can be speedily and cost-effectively built using housings selected from the two ranges of standard single-cavity housings (light-duty and NFPA fatigue-rated series) shown on pages 251 thro' 258. The fatigue-rated series is available with a choice of G (BSPF; ISO 228/1) or SAE size tapped ports, while the light-duty type is available with SAE ports only. To help you select the right sizes of tubing connectors, page 259 lists the size ranges and their full-thread tapping depths.

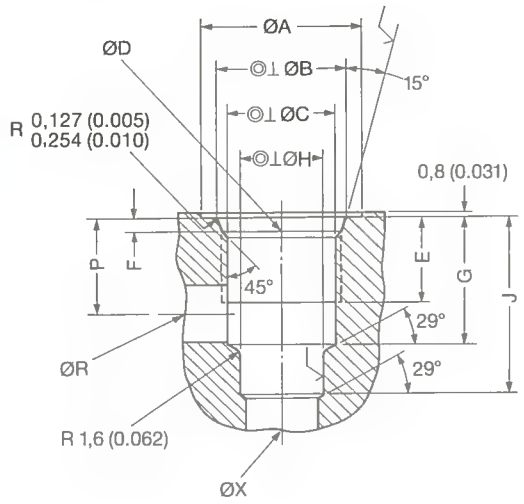
Either you, our customer, or Vickers Modular can design and manufacture customized manifolds or housings dedicated to individual applications. We call the resulting valve packages Modular Circuit Designs (MCDs). Cartridges selected for your application can be accommodated in one or more MCDs, according to your requirements. Where necessary, the cartridges can be complemented with accessories such as orifice discs, pilot piston assemblies, pilot sensing checks and blank cartridges, selected from pages 260 thro' 265.

Finally, and of equal importance in ensuring your complete satisfaction with Vickers Modular cartridge products and systems, there are recommendations about hydraulic fluids, temperature ranges, filtration and contaminant control, spare parts, repairs and warranty.

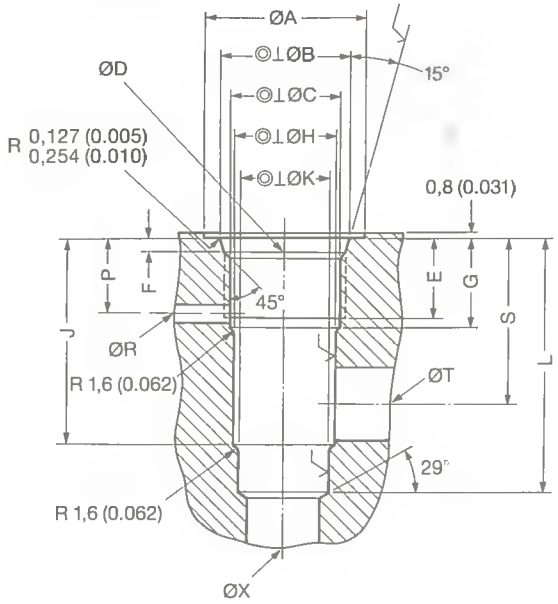
Standard cavity dimensions and tooling

Dimensions in mm (inches)

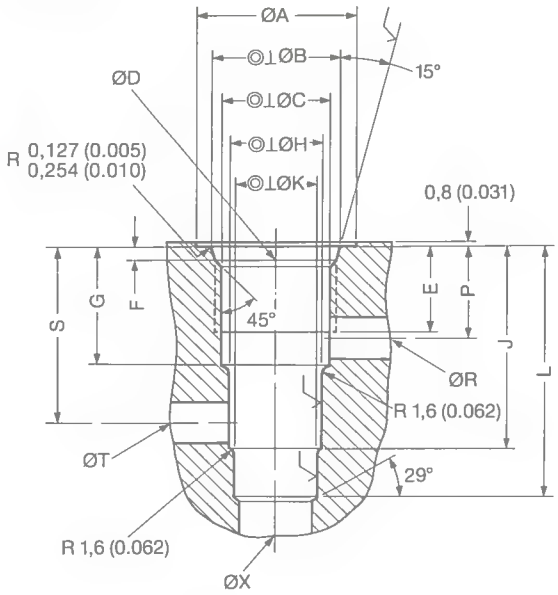
C--2 cavities**



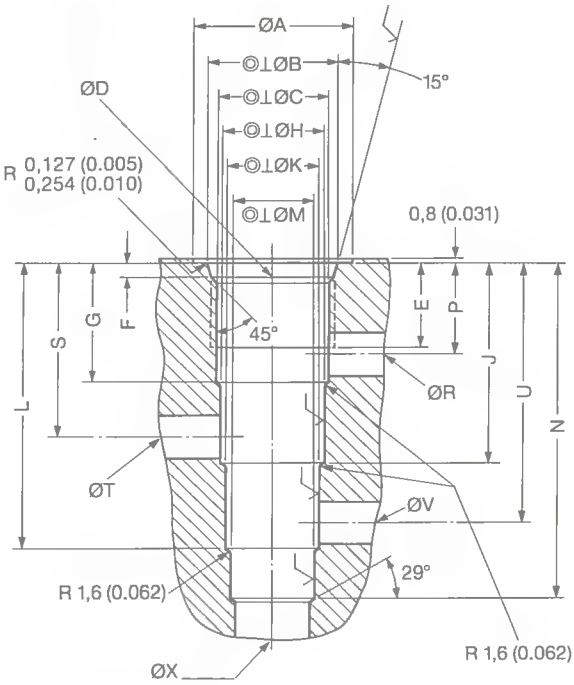
C--3S cavities**



C--3 cavities**



C--4 cavities**



$\sqrt{} = {}^{1,17\mu m}\sqrt{}$ or $^{46\mu in}\sqrt{}$

◎⊥ These diameters must be concentric with each other within 0,051 (0.002) and perpendicular to the spotface within 0,025 (0.001). They can be machined simultaneously with the appropriate Vickers Modular formed tools; see three pages on.

For dimension tables, see next two pages

Metric

Cavity	ØA spotface	ØB +0,051 0	ØC +0,051 0	ØD thread	E full thread	F	G	ØH ±0,0254	J
C1-8-2	30,16	20,65	17,47	0.750″-16 UNF	12,70	2,54/2,92	19,05	12,72	30,17
C2-8-2	30,16	20,65	17,47	0.750″-16 UNF	12,70	2,54/2,92	22,22	15,90	32,54
C-10-2	30,16	24,00	20,62	0.875″-14 UNF	15,88	2,54/2,92	23,80	15,90	33,32
C-10-3S	30,16	24,00	20,62	0.875″-14 UNF	14,29	2,54/2,92	16,51	19,08	38,48
C-10-3	30,16	24,00	20,62	0.875″-14 UNF	15,88	2,54/2,92	21,59	17,50	38,10
C-10-4	30,16	24,00	20,62	0.875″-14 UNF	15,88	2,54/2,92	22,22	19,08	38,10
C-16-2	44,45	35,58	31,34	1.312″-12 UN	22,22	3,30/3,68	34,14	28,62	46,84
C-16-3S	44,45	35,58	31,34	1.312″-12 UN	17,46	3,30/3,68	20,62	28,62	46,02
C-16-3	44,45	35,58	31,34	1.312″-12 UN	22,22	3,30/3,68	34,14	28,62	62,71
C-16-4	44,45	35,58	31,34	1.312″-12 UN	22,22	3,30/3,68	34,14	28,62	62,71
C-20-2	57,66	43,59	39,12	1.625″-12 UN	20,64	3,35/3,73	44,45	36,55	58,72
C-20-3S	57,66	43,59	39,12	1.625″-12 UN	20,64	3,35/3,73	23,82	36,55	64,29
C-20-3	57,66	43,59	39,12	1.625″-12 UN	20,64	3,35/3,73	44,45	36,55	85,72
C-20-4	57,66	43,59	39,12	1.625″-12 UN	20,64	3,35/3,73	44,45	36,55	85,72

Cavity	ØK ±0,0254	L	ØM ±0,0254	N	P	ØR max.	S	ØT max.	U	ØV max.	ØX max.
C1-8-2	—	—	—	—	14,29	9,52	—	—	—	—	11,11
C2-8-2	—	—	—	—	15,87	11,11	—	—	—	—	14,29
C-10-2	—	—	—	—	18,26	11,11	—	—	—	—	14,29
C-10-3S	17,50	47,62	—	—	14,29	3,18	30,96	13,49	—	—	15,88
C-10-3	15,90	47,62	—	—	18,26	6,35	34,13	6,35	—	—	14,29
C-10-4	17,50	53,98	15,90	63,50	18,26	6,35	34,13	6,35	50,00	6,35	14,29
C-16-2	—	—	—	—	24,60	19,05	—	—	—	—	19,05
C-16-3S	25,45	55,58	—	—	16,67	6,35	37,31	15,88	—	—	19,05
C-16-3	27,02	75,39	—	—	24,60	15,88	53,18	15,88	—	—	19,05
C-16-4	27,02	91,29	25,45	103,99	24,60	15,88	53,18	15,88	81,76	15,88	19,05
C-20-2	—	—	—	—	30,96	25,40	—	—	—	—	30,16
C-20-3S	33,38	77,77	—	—	19,84	6,35	50,00	25,40	—	—	30,16
C-20-3	33,38	100,02	—	—	30,96	25,40	71,44	25,40	—	—	30,16
C-20-4	33,38	127,00	31,78	141,27	30,96	25,40	71,44	25,40	112,71	25,40	30,16

English

Cavity	A dia. spotface	B dia. +0.002″ 0	C dia. +0.002″ 0	D dia. thread	E full thread	F	G	H dia. ±0.001″	J
C1-8-2	1.188″	0.813″	0.688″	0.750″-16 UNF	0.500″	0.100″/0.115″	0.750″	0.501″	1.188″
C2-8-2	1.188″	0.813″	0.688″	0.750″-16 UNF	0.500″	0.100″/0.115″	0.875″	0.626″	1.281″
C-10-2	1.188″	0.945″	0.812″	0.875″-14 UNF	0.625″	0.100″/0.115″	0.937″	0.626″	1.312″
C-10-3S	1.188″	0.945″	0.812″	0.875″-14 UNF	0.562″	0.100″/0.115″	0.650″	0.751″	1.515″
C-10-3	1.188″	0.945″	0.812″	0.875″-14 UNF	0.625″	0.100″/0.115″	0.850″	0.689″	1.500″
C-10-4	1.188″	0.945″	0.812″	0.875″-14 UNF	0.625″	0.100″/0.115″	0.875″	0.751″	1.500″
C-16-2	1.750″	1.401″	1.234″	1.312″-12 UN	0.875″	0.130″/0.145″	1.344″	1.127″	1.844″
C-16-3S	1.750″	1.401″	1.234″	1.312″-12 UN	0.687″	0.130″/0.145″	0.812″	1.127″	1.812″
C-16-3	1.750″	1.401″	1.234″	1.312″-12 UN	0.875″	0.130″/0.145″	1.344″	1.127″	2.469″
C-16-4	1.750″	1.401″	1.234″	1.312″-12 UN	0.875″	0.130″/0.145″	1.344″	1.127″	2.469″
C-20-2	2.270″	1.716″	1.540″	1.625″-12 UN	0.812″	0.132″/0.147″	1.750″	1.439″	2.312″
C-20-3S	2.270″	1.716″	1.540″	1.625″-12 UN	0.812″	0.132″/0.147″	0.938″	1.439″	2.531″
C-20-3	2.270″	1.716″	1.540″	1.625″-12 UN	0.812″	0.132″/0.147″	1.750″	1.439″	3.375″
C-20-4	2.270″	1.716″	1.540″	1.625″-12 UN	0.812″	0.132″/0.147″	1.750″	1.439″	3.375″

Cavity	K dia. ±0.001″	L	M dia. ±0.001″	N	P	R dia. max.	S	T dia. max.	U	V dia. max.	X dia. max.
C1-8-2	—	—	—	—	0.562″	0.375″	—	—	—	—	0.437″
C2-8-2	—	—	—	—	0.625″	0.437″	—	—	—	—	0.562″
C-10-2	—	—	—	—	0.719″	0.437″	—	—	—	—	0.562″
C-10-3S	0.689″	1.875″	—	—	0.562″	0.125″	1.219″	0.531″	—	—	0.625″
C-10-3	0.626″	1.875″	—	—	0.719″	0.250″	1.344″	0.250″	—	—	0.562″
C-10-4	0.689″	2.125″	0.626″	2.500″	0.719″	0.250″	1.344″	0.250″	1.969″	0.250″	0.562″
C-16-2	—	—	—	—	0.969″	0.750″	—	—	—	—	0.750″
C-16-3S	1.002″	2.188″	—	—	0.656″	0.250″	1.469″	0.625″	—	—	0.750″
C-16-3	1.064″	2.968″	—	—	0.969″	0.625″	1.094″	0.625″	—	—	0.750″
C-16-4	1.064″	3.594″	1.002″	4.094″	0.969″	0.625″	1.094″	0.625″	3.219″	0.625″	0.750″
C-20-2	—	—	—	—	1.219″	1.000″	—	—	—	—	1.187″
C-20-3S	1.314″	3.062″	—	—	0.781″	0.250″	1.969″	1.000″	—	—	1.187″
C-20-3	1.314″	3.938″	—	—	1.219″	1.000″	1.812″	1.000″	—	—	1.187″
C-20-4	1.314″	5.000″	1.251″	5.562″	1.219″	1.000″	1.812″	1.000″	4.437″	1.000″	1.187″

Tooling for machining standard cavities

Customers wishing to manufacture their own housings or manifolds can purchase Vickers Modular cavity tools, designed to ensure exactly the right cavity dimensions and surface finishes. For in-depth advice on the machining of cavities consult your local sales engineer.

The range covers roughing tools that create the basic shape of the whole cavity, and separate finishing tools for a) the cylindrical bores and b) the spotface plus O-ring recess. Cavity thread forms (UNF or UN) can be machined by standard tooling available from local tool suppliers.

Roughing tools

For cavity size	Tool designation, for machining: Aluminium	Steel or cast iron	Shank diameter mm (inches)
C1-8-2 C2-8-2	RT1-8-2-A-8028 RT2-8-2-A-8029	RT1-8-2-S-8033 RT2-8-2-S-8034	17,46 (0.687)
C-10-2 C-10-3S C-10-3 C-10-4	RT-10-2-A-8030 RT-10-3S-A-8099 RT-10-3-A-8038 RT-10-4-A-8072	RT-10-2-S-8035 RT-10-3S-S-8209 RT-10-3-S-8043 RT-10-4-S-8073	20,6 (0.812)
C-16-2 C-16-3S C-16-3 C-16-4	RT-16-2-A-8031 RT-16-3S-A-8040 RT-16-3-A-8039 RT-16-4-A-8074	RT-16-2-S-8036 RT-16-3S-S-8045 RT-16-3-S-8044 RT-16-4-S-8075	25,4 (1.000)
C-20-2 C-20-3S C-20-3 C-20-4	RT-20-2-A-8032 RT-20-3S-A-8042 RT-20-3-A-8041 RT-20-4-A-8076	RT-20-2-S-8037 RT-20-3S-S-8047 RT-20-3-S-8046 RT-20-4-S-8077	

Finishing tools

For cavity size	Tool designation	Shank diameter mm (inches)	For machining:
Tools for cylindrical bores			
C1-8-2	FT1-8-2-A-8023	19,05 (0.750)	Aluminium
	FT1-8-2-AS-8070		Aluminium/steel/cast iron
C2-8-2	FT2-8-2-A-8024		Aluminium
	FT2-8-2-AS-8071		Aluminium/steel/cast iron
C-10-2	FT-10-2-A-8010	25,4 (1.000)	Aluminium
	FT-10-2-AS-8048	19,05 (0.750)	Aluminium/steel/cast iron
C-10-3S	FT-10-3S-A-8098	25,4 (1.000)	Aluminium
	FT-10-3S-AS-8210		Aluminium/steel/cast iron
C-10-3	FT-10-3-A-8049		Aluminium
	FT-10-3-AS-8050	19,05 (0.750)	Aluminium/steel/cast iron
C-10-4	FT-10-4-A-8051	25,4 (1.000)	Aluminium
	FT-10-4-AS-8052	19,05 (0.750)	Aluminium/steel/cast iron
C-16-2	FT-16-2-AS-8078		
C-16-3S	FT-16-3S-AS-8081	25,4 (1.000)	
C-16-3	FT-16-3-AS-8080		
C-16-4	FT-16-4-AS-8084	19,05 (0.750)	
C-20-2	FT-20-2-AS-8079		
C-20-3S	FT-20-3S-AS-8083	25,4 (1.000)	
C-20-3	FT-20-3-AS-8082		
C-20-4	FT-20-4-AS-8085	19,05 (0.750)	
Tools for spotface plus O-ring recess			
C-10-(S)	FTPF-10-H-8093	19,05 (0.750)	Aluminium
	FTPF-10-I-8102		Steel/cast iron
C-16-(S)	FTPF-16-H-8066		Aluminium
	FTPF-16-C-8067		Steel/cast iron
C-20-(S)	FTPF-20-H-8068	25,4 (1.000)	Aluminium
	FTPF-20-C-8069		Steel/cast iron

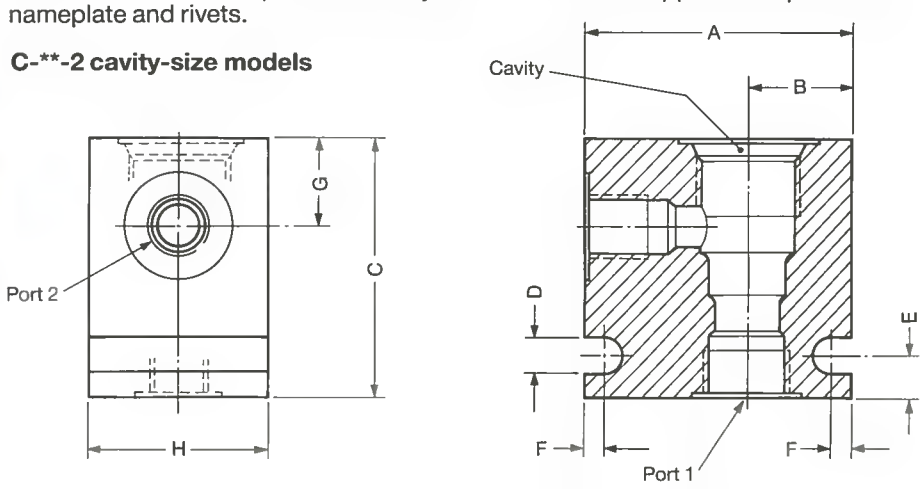
Standard fatigue-rated housings, single cavity type

NFPA pressure-rated (10 million cycle fatigue rating) to 207 bar (3000 psi) max.

Dimensions in mm (inches)
Order housings either complete with the cartridge required, see the cartridge's "Model code", or as separate items by "Part no." below. Supplied complete with nameplate and rivets.

3rd angle projection

C--2 cavity-size models**

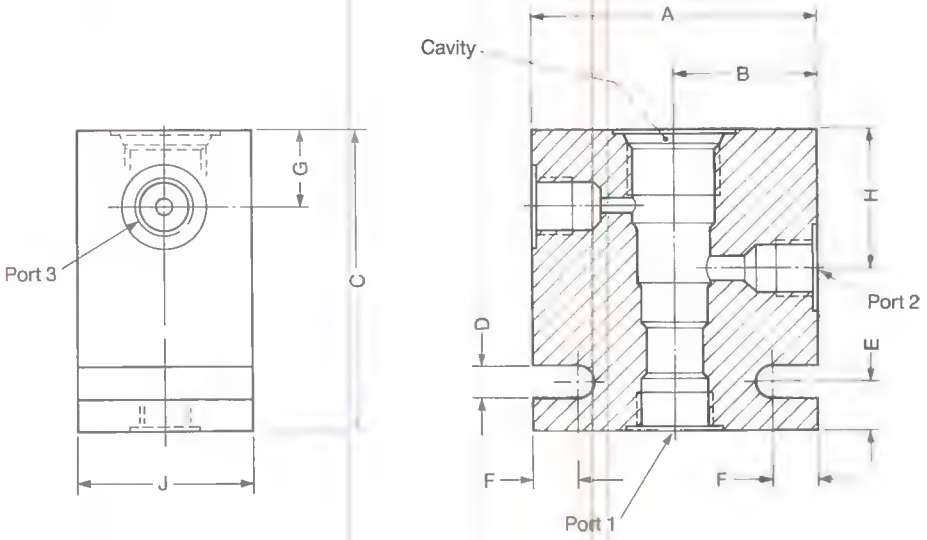


Cavity	Part no.	MC ref. no.	Port 1	Port 2	A	B
C-10-2	566096	23035	SAE 6	SAE 6	63,50 (2.500)	25,4 (1.000)
	566097	23036	SAE 8	SAE 8		
	566098	23037	G¼"▲	G¼"▲		
	566099	23038	G⅜"▲	G⅜"▲		
C-16-2	566112	30695	SAE 10	SAE 10	88,90 (3.500)	34,92 (1.375)
	566113	30697	SAE 12	SAE 12		
	566114	30694	G½"▲	G½"▲		
	566115	30696	G¾"▲	G¾"▲		
C-20-2	566128	30711	SAE 12	SAE 12	101,60 (4.000)	38,10 (1.500)
	566129	30713	SAE 16	SAE 16		
	566130	30710	G¾"▲	G¾"▲		
	566131	30712	G1"▲	G1"▲		

▲ BSPF

Cavity	C	D	E	F	G	H	Mass approx. kg (lb)
C-10-2	63,50 (2.500)	7,14 (0.281)	19,05 (0.750)	9,52 (0.375)	20,80 (0.819)	50,80 (2.000)	0,45 (1.0)
C-16-2	88,90 (3.500)	8,74 (0.344)	25,4 (1.000)	10,31 (0.406)	28,42 (1.119)	63,50 (2.500)	1,25 (2.75)
C-20-2	101,60 (4.000)	8,74 (0.344)	25,4 (1.000)	10,31 (0.406)	36,04 (1.419)	82,55 (3.250)	1,8 (4.0)

C--3S cavity-size models, standard fatigue-rated housings**

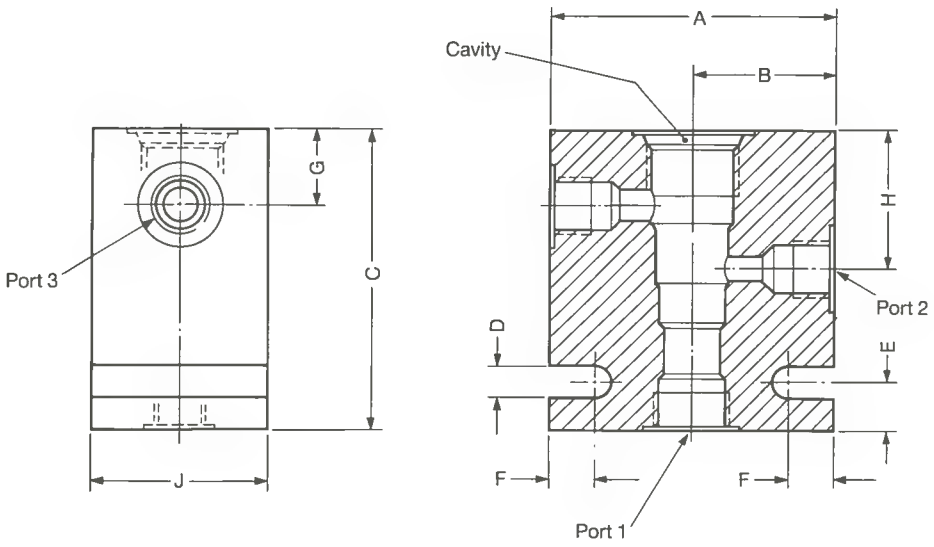


Cavity	Part no.	MC ref. no.	Port 1	Port 2	Port 3	A	B
C-10-3S	566100	23039	SAE 6	SAE 6	SAE 6	76,20 (3.000)	38,10 (1.500)
	566101	23111	SAE 8	SAE 8	SAE 6		
	566102	23040	G¼"▲	G¼"▲	G¼"▲		
	566103	23114	G⅜"▲	G⅜"▲	G¼"▲		
C-16-3S	566116	30699	SAE 10	SAE 10	SAE 6	114,30 (4.500)	60,32 (2.375)
	566117	30701	SAE 12	SAE 12	SAE 6		
	566118	30698	G½"▲	G½"▲	G⅜"▲		
	566119	30700	G¾"▲	G¾"▲	G⅜"▲		
C-20-3S	566132	30715	SAE 12	SAE 12	SAE 6	127,00 (5.000)	63,50 (2.500)
	566133	30717	SAE 16	SAE 16	SAE 6		
	566134	30714	G¾"▲	G¾"▲	G⅜"▲		
	566135	30716	G1"▲	G1"▲	G⅜"▲		

▲ BSPF

Cavity	C	D	E	F	G	H	J	Mass approx. kg (lb)
C-10-3S	76,20 (3.000)	7,14 (0.281)	19,05 (0.750)	9,52 (0.375)	16,84 (0.663)	33,50 (1.319)	50,80 (2.000)	0,75 (1.65)
C-16-3S	114,30 (4.500)	8,74 (0.344)	25,40 (1.000)	10,31 (0.406)	20,47 (0.806)	41,12 (1.619)	63,50 (2.500)	2,0 (4.4)
C-20-3S	127,00 (5.000)	8,74 (0.344)	25,40 (1.000)	10,31 (0.406)	24,92 (0.981)	55,09 (2.169)	82,55 (3.250)	3,63 (8.0)

C--3 cavity-size models, standard fatigue-rated housings**

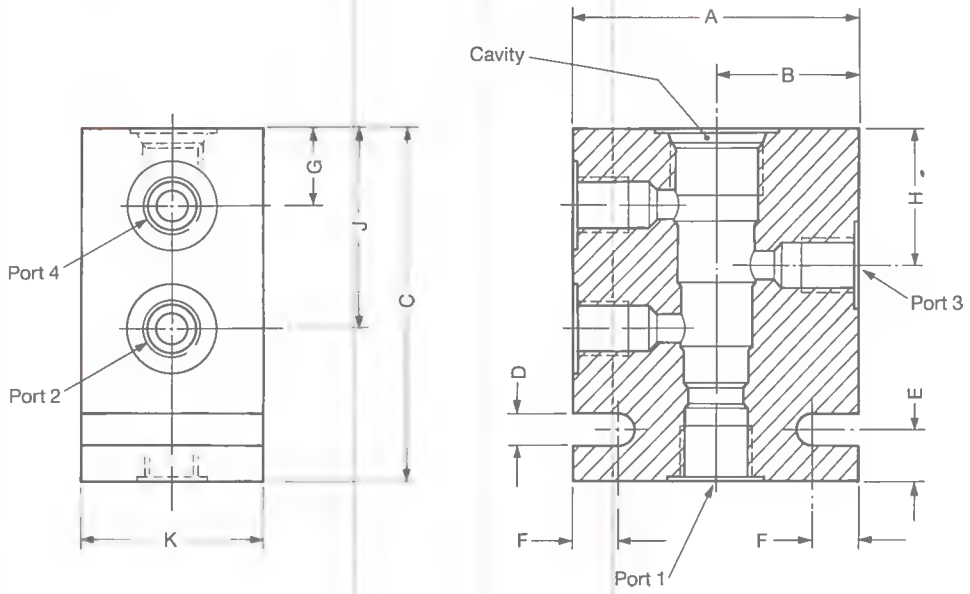


Cavity	Part no.	MC ref. no.	Port 1	Port 2	Port 3	A	B
C-10-3	566100	23039	SAE 6	SAE 6	SAE 6	76,20 (3.000)	38,10 (1.500)
	566101	23111	SAE 8	SAE 8	SAE 6		
	566102	23040	G¼"▲	G¼"▲	G¼"▲		
	566103	23114	G⅜"▲	G⅜"▲	G⅜"▲		
C-16-3	566116	30699	SAE 10	SAE 10	SAE 10	114,30 (4.500)	60,32 (2.375)
	566117	30701	SAE 12	SAE 12	SAE 12		
	566118	30698	G½"▲	G½"▲	G½"▲		
	566119	30700	G¾"▲	G¾"▲	G¾"▲		
C-20-3	566132	30715	SAE 12	SAE 12	SAE 12	127,00 (5.000)	63,50 (2.500)
	566133	30717	SAE 16	SAE 16	SAE 16		
	566134	30714	G¾"▲	G¾"▲	G¾"▲		
	566135	30716	G1"▲	G1"▲	G1"▲		

▲ BSPF

Cavity	C	D	E	F	G	H	J	Mass approx. kg (lb)
C-10-3	76,20 (3.000)	7,14 (0.281)	19,05 (0.750)	9,52 (0.375)	20,80 (0.819)	36,68 (1.444)	50,80 (2.000)	0,75 (1.65)
C-16-3	114,30 (4.500)	8,74 (0.344)	25,4 (1.000)	10,31 (0.406)	28,42 (1.119)	57,00 (2.244)	63,50 (2.500)	2,04 (4.5)
C-20-3	139,70 (5.500)	8,74 (0.344)	25,4 (1.000)	10,31 (0.406)	36,04 (1.419)	76,53 (3.013)	82,55 (3.250)	3,5 (7.71)

C-**-4 cavity-size models, standard fatigue-rated housings



Cavity	Part no.	MC ref. no.	Port 1	Port 2	Port 3	Port 4	A	B
C-10-4	566108	23043	SAE 6	SAE 6	SAE 6	SAE 6	76,20 (3.000)	38,10 (1.500)
	566109	23113	SAE 8	SAE 8	SAE 8	SAE 8		
	566110	23044	G¼"▲	G¼"▲	G¼"▲	G¼"▲		
	566111	23116	G⅜"▲	G⅜"▲	G⅜"▲	G⅜"▲		
C-16-4	566124	30707	SAE 10	SAE 10	SAE 10	SAE 10	114,30 (4.500)	60,32 (2.375)
	566125	30709	SAE 12	SAE 12	SAE 12	SAE 12		
	566126	30706	G½"▲	G½"▲	G½"▲	G½"▲		
	566127	30708	G¾"▲	G¾"▲	G¾"▲	G¾"▲		
C-20-4	566140	30723	SAE 12	SAE 12	SAE 12	SAE 12	127,00 (5.000)	63,50 (2.500)
	566141	30725	SAE 16	SAE 16	SAE 16	SAE 16		
	566142	30722	G¾"▲	G¾"▲	G¾"▲	G¾"▲		
	566143	30724	G1"▲	G1"▲	G1"▲	G1"▲		

▲ BSPF

Cavity	C	D	E	F	G	H	J	K	Mass approx. kg (lb)
C-10-4	88,90 (3.500)	7,14 (0.281)	12,70 (0.500)	9,52 (0.375)	20,80 (0.819)	36,68 (1.444)	52,55 (2.069)	50,8 (2.000)	0,91 (2.0)
C-16-4	139,70 (5.500)	8,74 (0.344)	25,4 (1.000)	10,31 (0.406)	28,42 (1.119)	57,00 (2.244)	85,57 (3.369)	63,50 (2.500)	2,4 (5.29)
C-20-4	177,80 (7.000)	8,74 (0.344)	19,05 (0.750)	10,31 (0.406)	36,04 (1.419)	76,53 (3.013)	117,80 (4.638)	82,55 (3.250)	4,77 (10.5)

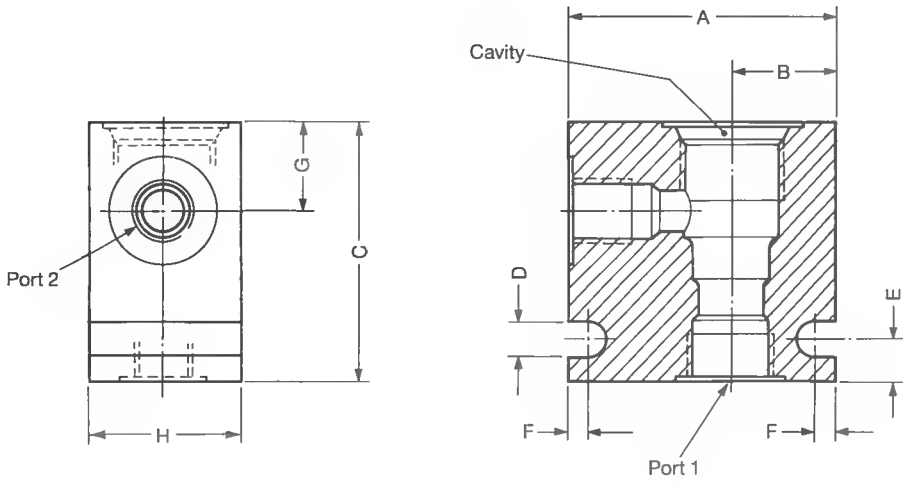
Standard light-duty housings, single cavity type

Max. operating pressure 207 bar (3000 psi)

Dimensions in mm (inches)
Order housings either complete with the cartridge required, see the cartridge's "Model code", or as separate items by "Part no." below. Supplied complete with nameplate and rivets.

3rd angle projection

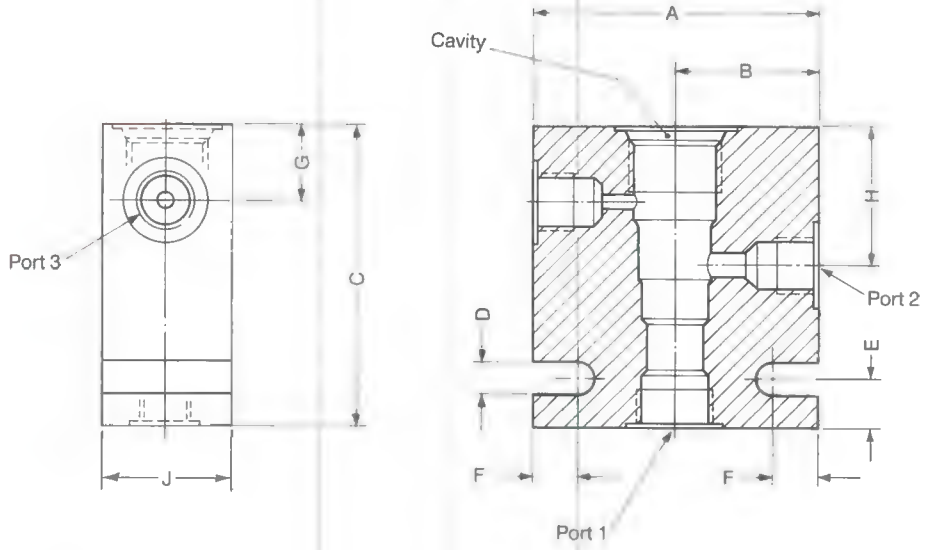
C--2 cavity-size models**



Cavity	Part no.	MC ref. no.	Port 1	Port 2	A	B
C-10-2	566151	20057A	SAE 6	SAE 6	50,8 (2.0)	19,05 (0.75)
C-16-2	566149	20460A	SAE 12	SAE 12	76,2 (3.0)	28,57 (1.125)
C-20-2	566409	20822	SAE 16	SAE 16	88,9 (3.5)	34,29 (1.35)

Cavity	C	D	E	F	G	H	Mass approx. kg (lb)
C-10-2	50,8 (2.0)	7,11 (0.28)	12,7 (0.5)	3,17 (0.125)	19,05 (0.75)	31,75 (1.25)	0,16 (0.35)
C-16-2	76,2 (3.0)	8,64 (0.34)	19,05 (0.75)	4.06 (0.16)	25,4 (1.0)	47,63 (1.875)	0,55 (1.21)
C-20-2	88,9 (3.5)	8,64 (0.34)	21,6 (0.85)	4,06 (0.16)	36,83 (1.45)	68,58 (2.7)	0,86 (1.90)

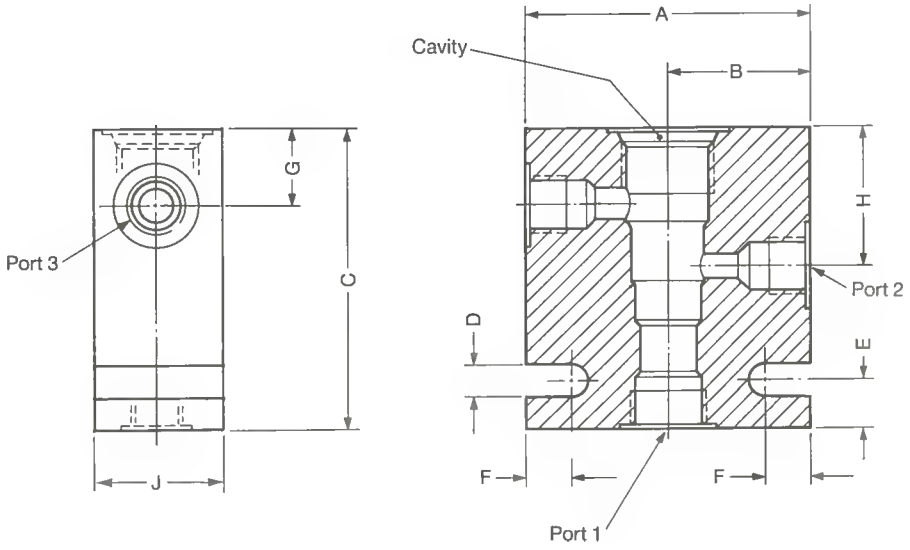
C--3S cavity-size models, standard light-duty housings**



Cavity	Part no.	MC ref. no.	Port 1	Port 2	Port 3	A	B
C-10-3S	566413	30472	SAE 6	SAE 6	SAE 4	63,5 (2.5)	34,93 (1.375)
C-16-3S	566414	30282	SAE 12	SAE 12	SAE 6	88,9 (3.5)	47,63 (1.875)
C-20-3S	566415	30286	SAE 16	SAE 16	SAE 6	101,6 (4.0)	57,15 (2.250)

Cavity	C	D	E	F	G	H	J	Mass approx. kg (lb)
C-10-3S	69,85 (2.75)	7,14 (0.28)	12,7 (0.5)	3,17 (0.125)	12,7 (0.5)	31,75 (1.25)	38,1 (1.5)	0,23 (0.51)
C-16-3S	88,9 (3.5)	8,74 (0.344)	19,05 (0.75)	4,06 (0.16)	17,47 (0.688)	38,1 (1.5)	60,33 (2.375)	0,75 (1.66)
C-20-3S	107,95 (4.25)	8,74 (0.344)	19,05 (0.75)	4,06 (0.16)	20,65 (0.813)	50,8 (2.0)	69,85 (2.75)	1,19 (2.62)

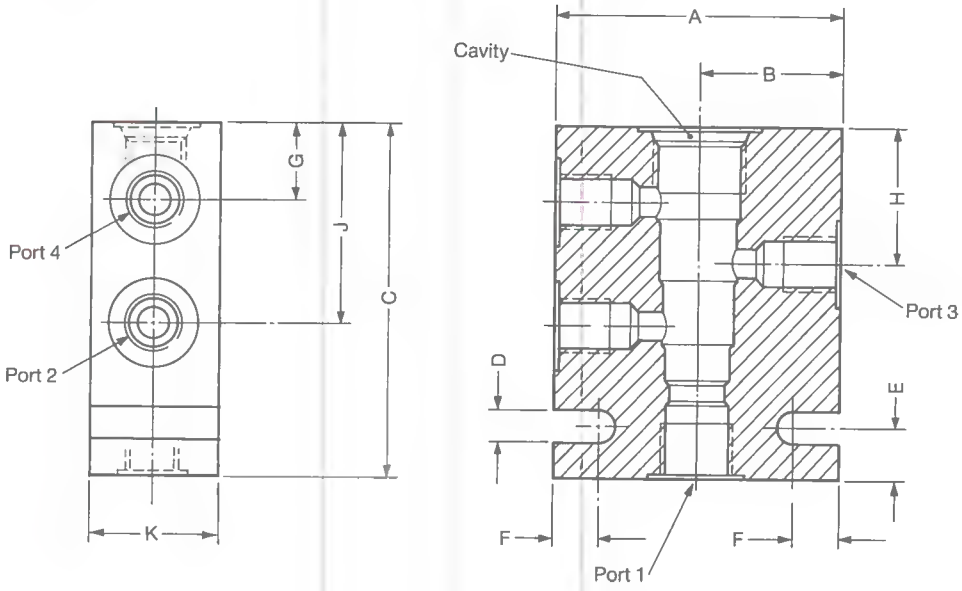
C--3 cavity-size models, standard light-duty housings**



Cavity	Part no.	MC ref. no.	Port 1	Port 2	Port 3	A	B
C-10-3	566407	20197A	SAE 6	SAE 6	SAE 6	63,5 (2.5)	31,75 (1.25)
C-16-3	566152	30343A	SAE 12	SAE 12	SAE 12	101,6 (4.0)	50,8 (2.0)
C-20-3	566408	30223	SAE 16	SAE 16	SAE 16	114,3 (4.5)	57,15 (2.25)

Cavity	C	D	E	F	G	H	J	Mass approx. kg (lb)
C-10-3	66,67 (2.625)	7,11 (0.28)	12,7 (0.5)	3,17 (0.125)	19,05 (0.75)	34,92 (1.375)	31,75 (1.25)	0,29 (0.64)
C-16-3	107,95 (4.25)	8,64 (0.34)	25,4 (1.0)	4,06 (0.16)	25,4 (1.0)	53,98 (2.125)	50,8 (2.0)	1,04 (2.3)
C-20-3	139,7 (5.5)	10,41 (0.41)	25,4 (1.0)	4,06 (0.16)	31,75 (1.25)	72,14 (2.84)	63,5 (2.5)	1,78 (3.92)

C--4 cavity-size models, standard light-duty housings**



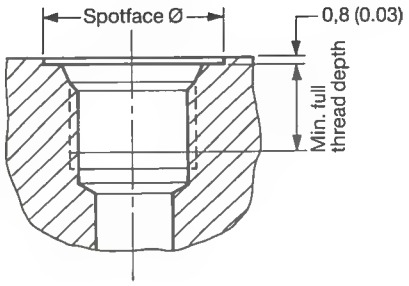
Cavity	Part no.	MC ref. no.	Port 1	Port 2	Port 3	Port 4	A	B
C-10-4	566410	20207B	SAE 6	SAE 6	SAE 6	SAE 6	63,5 (2.5)	31,75 (1.25)
C-16-4	566411	30211A	SAE 12	SAE 12	SAE 12	SAE 12	101,6 (4.0)	50,8 (2.0)
C-20-4	566412	30227	SAE 16	SAE 16	SAE 16	SAE 16	114,3 (4.5)	57,15 (2.25)

Cavity	C	D	E	F	G	H	J	K	Mass approx. kg (lb)
C-10-4	82,55 (3.25)	7,14 (0.28)	9,53 (0.375)	3,17 (0.125)	19,05 (0.75)	34,93 (1.375)	50,8 (2.0)	31,75 (1.25)	0,33 (0.72)
C-16-4	133,35 (5.25)	8,74 (0.344)	22,23 (0.875)	3,81 (0.15)	25,4 (1.0)	53,98 (2.125)	82,55 (3.25)	50,8 (2.0)	1,47 (3.24)
C-20-4	177,8 (7.0)	10,41 (0.41)	25,4 (1.0)	4,06 (0.16)	31,75 (1.25)	72,14 (2.84)	113,54 (4.47)	63,5 (2.5)	2,61 (5.76)

Port dimensions

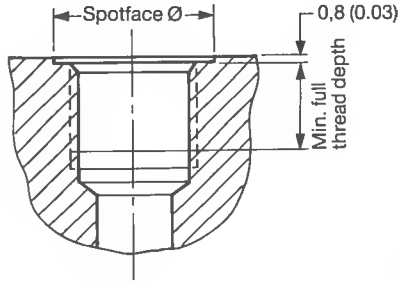
Key dimensions in standard housings, in mm (inches)

SAE sizes



SAE size	Thread size	Min. spotface Ø	Min. full thrd. depth
4	0.4375″-20 UNF-2B	21,1 (0.828)	11,5 (0.454)
6	0.5625″-18 UNF-2B	24,7 (0.969)	12,7 (0.500)
8	0.750″-16 UNF-2B	30,2 (1.188)	14,2 (0.562)
10	0.875″-14 UNF-2B	34,2 (1.344)	16,6 (0.656)
12	1.0625″-12 UN-2B	41,3 (1.625)	19,05 (0.750)
16	1.3125″-12 UN-2B	48,6 (1.910)	19,05 (0.750)

G sizes (BSPF, ISO 228)



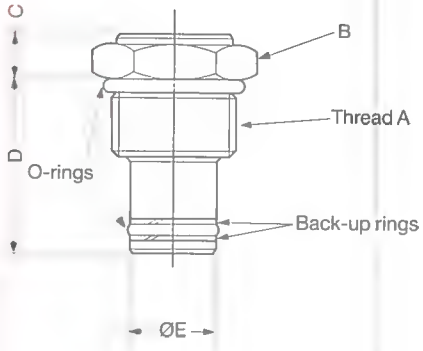
G (BSPF) thread size	Min. spotface Ø	Min. full thrd. depth
G¼″	24 (0.94)	12,2 (0.48)
G⅜″	27 (1.06)	12,2 (0.48)
G½″	33 (1.29)	15,0 (0.59)
G¾″	42 (1.65)	16,3 (0.64)
G1″	47 (1.85)	19,1 (0.75)

Accessories for MCD valve packages

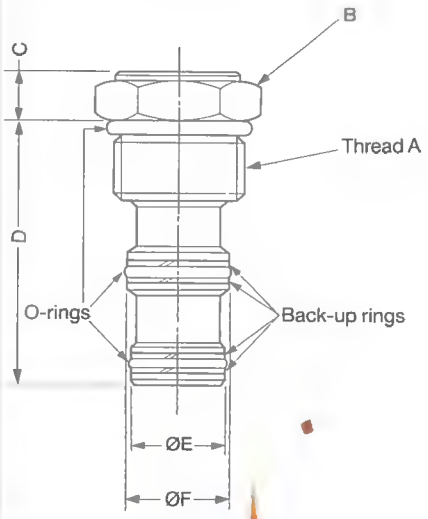
Blank cartridges
To block flow between the ports in any unused standard cavity, in a housing or manifold. Order cartridges by "Part no."; see next page.

Installation dimensions in mm (inches)

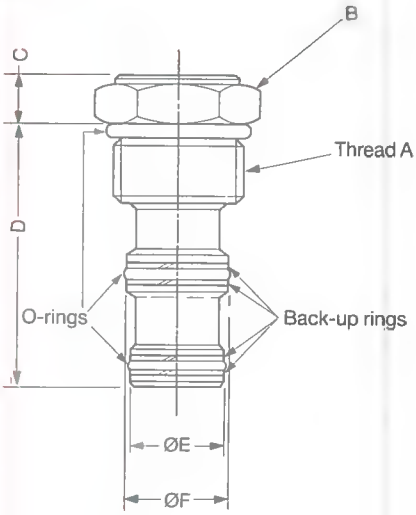
For C-**-2 cavities



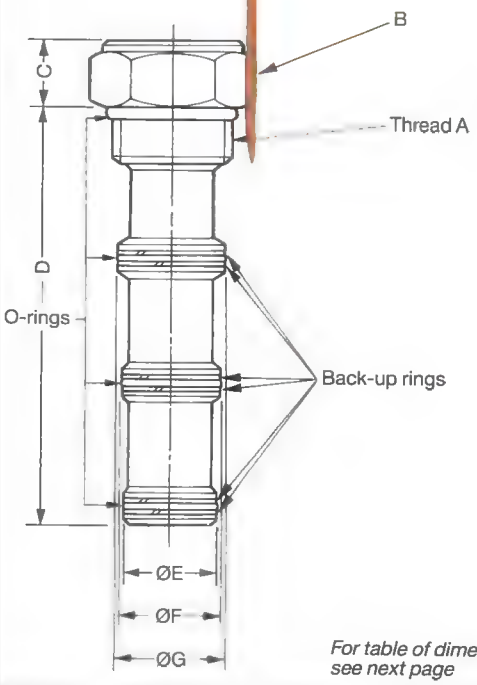
For C-**-3S cavities



For C-**-3 cavities



For C-**-4 cavities



For table of dimensions, see next page

To fit cavity size	A	B	C	D	ØE	ØF	ØG	Part no.▲	MC ref. no. ▲
C-10-2	0.875″-14 UNF	25,4 (1.0) A/F hex. Torque 47-54 Nm (35-40 lbf ft)	7,95 (0.313)	31,75 (1.25)	15,82 15,77 (0.623) (0.621)	—	—	565814	20601
C-10-3S				74,25 (1.860)	17,45 17,40 (0.687) (0.685)	19,02 18,97 (0.749) (0.747)	—	566436	22723
C-10-3				46,03 (1.812)	15,82 15,77 (0.623) (0.621)	17,42 17,37 (0.686) (0.684)	—	565815	20602
C-10-4				61,93 (2.438)	15,82 15,77 (0.623) (0.621)	17,42 17,37 (0.686) (0.684)	19,00 18,95 (0.748) (0.746)	566244	20603
C-16-2	1.3125″-12 UN	38,1 (1.50) A/F hex. Torque 109-122 Nm (80-90 lbf ft)	12,7 (0.50)	44,5 (1.75)	28,58 28,50 (1.125) (1.122)	—	—	565816	21025
C-16-3S				55,6 (2.188)	25,37 25,32 (0.999) (0.997)	28,55 28,50 (1.124) (1.122)	—	566438	21026
C-16-3				73,1 (2.875)	26,95 26,90 (1.061) (1.059)	28,55 28,50 (1.124) (1.122)	—	566437	21027
C-16-4				101,6 (4.0)	25,37 25,32 (0.999) (0.997)	26,95 26,90 (1.061) (1.059)	28,55 28,50 (1.124) (1.122)	566439	21028
C-20-2	1.625″-12 UN	47,63 (1.875) A/F hex. Torque 129-156 Nm (95-115 lbf ft)	13,5 (0.531)	57,2 (2.25)	36,47 36,42 (1.436) (1.434)	—	—	566440	21316
C-20-3S				76,2 (3.0)	33,30 33,22 (1.311) (1.308)	36,47 36,42 (1.436) (1.433)	—	566442	21318
C-20-3				98,5 (3.875)	33,30 33,22 (1.311) (1.308)	36,47 36,42 (1.436) (1.433)	—	566441	21317
C-20-4				139,7 (5.50)	31,70 31,62 (1.248) (1.245)	33,30 33,22 (1.311) (1.308)	36,47 36,42 (1.436) (1.433)	566443	21319

▲ **Important** – The cartridges listed are complete with seals compatible with antiwear hydraulic oil. If cartridges are to be compatible with both antiwear oil and phosphate ester then order cartridges, by part number above, **plus** the appropriate and separate SK2-****V** seal kit, as listed in "Spare parts" on next page. Before using the cartridge, change the fitted seals to those in the separate seal kit.

Spare parts for blank cartridges
The only parts available are seal kits comprising seals and back-up rings

Cartridge		Seal kit compatible with	
Part no.	MC ref. no.	Antiwear oil	Antiwear oil and phosphate ester
565814	20601	SK2-10-2	SK2-10V-2
565815	20602	SK2-10-3	SK2-10V-3
565816	21025	SK2-16-2	SK2-16V-2
566244	20603	SK2-10-4	SK2-10V-4
566436	22723	SK2-10-3S	SK2-10V-3S
566437	21027	SK2-16-3	SK2-16V-3
566438	21026	SK2-16-3S	SK2-16V-3S
566439	21028	SK2-16-4	SK2-16V-4
566440	21316	SK2-20-2	SK2-20V-2
566441	21317	SK2-20-3	SK2-20V-3
566442	21318	SK2-20-3S	SK2-20V-3S
566443	21319	SK2-20-4	SK2-20V-4

Orifice discs

An orifice disc can be installed at the bottom of a standard cavity to create a local pressure drop in the flow to or from port 1 of the cartridge.

Two series of discs are available according to the maximum pressure drop required:

1. Flat discs
   Max. pressure drop 13,8 bar (200 psi)

2. Conical discs
   Max. pressure drop 207 bar (3000 psi)

Orifice sizing
Given a required flow rate at a particular pressure drop under standard test conditions, the recommended size of orifice can be calculated in metric or English dimensions as below:

$$D = 1{,}35\sqrt{\frac{Q}{(\triangle p)^{0,5}}}$$

Where D = Orifice diameter (mm)
Q = Flow rate (l/min)
△p = Pressure drop (bar)

$$D = 0.203\sqrt{\frac{Q}{(\triangle p)^{0.5}}}$$

Where D = Orifice diameter (inches)
Q = Flow rate (US gpm)
△p = Pressure drop (psi)

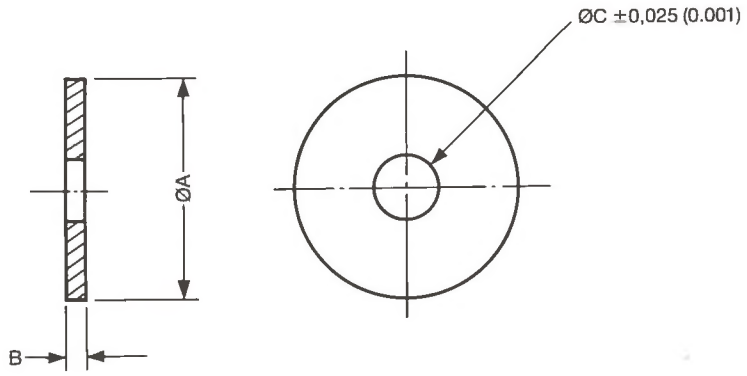
Available discs
Current production includes those listed below, and others are available on request

For cavity size(s)	Orifice diameter mm (inches)	Max. pressure drop bar (psi)	Part no.	MC ref. no.
C-10-2 C-10-3 C-10-4	Blank▲	13,8 (200)	565817	20351-/
	0,51 (0.020)		566452	20351-/020
	0,71 (0.028)		566453	20351-/028
	0,76 (0.030)		566454	20351-/030
	0,81 (0.032)		566455	20351-/032
	1,32 (0.052)		566456	20351-/052
	1,57 (0.062)		566457	20351-/062
	1,60 (0.063)		566458	20351-/063
	1,65 (0.065)		566459	20351-/065
	1,78 (0.070)		566460	20351-/070
	2,28 (0.090)		566461	20351-/090
	2,36 (0.093)		566462	20351-/093
	2,44 (0.096)		566463	20351-/096
	2,49 (0.098)		566464	20351-/098
	2,77 (0.109)		566465	20351-/109
	3,17 (0.125)		566466	20351-/125
	3,25 (0.128)		566467	20351-/128
	3,30 (0.130)		566468	20351-/130
	3,43 (0.135)		566469	20351-/135
	3,55 (0.140)		566470	20351-/140
	3,58 (0.141)		566471	20351-/141
	3,96 (0.156)		566473	20351-/156
	4,21 (0.166)		566474	20351-/166
	4,75 (0.187)		566475	20351-/187
	5,15 (0.203)		566476	20351-/203
	7,14 (0.281)		566477	20351-/281
C-10-2 C-10-3 C-10-4	Blank▲	207 (3000)	566478	21821-/
	0,78 (0.031)		566479	21821-/031
	1,09 (0.043)		566480	21821-/043
	1,19 (0.047)		566481	21821-/047
	1,52 (0.060)		566482	21821-/060
	2,28 (0.090)		566483	21821-/090
	2,36 (0.093)		566484	21821-/093
C-16-2	Blank▲	13,8 (200)	566247	21139-/
	7,52 (0.296)		566485	21139-/296
C-16-3	Blank▲	13,8 (200)	566248	21140-/
C-16-3S■ C-16-4	Blank▲	13,8 (200)	566249	21141-/

▲ For drilling by customer.
■ Discs not usable when DPS2-16 valves (see page 242) are used in this cavity.

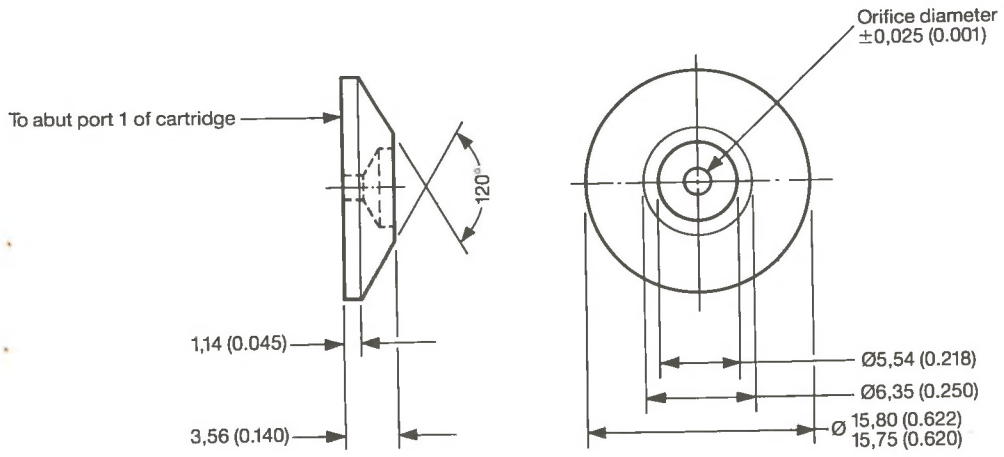
Installation dimensions in mm (inches)

Flat discs
Max. pressure drop 13,8 bar (200 psi)



MC ref. no. series	ØA	B	ØC	Cavity size
20351	15,80/15,75 (0.622/0.620)	1,52 (0.0598)	User to specify	C-10-2/3/4
21139	28,58/28,52 (1.125/1.123)	2,03 (0.08)		C-16-2
21140	26,97/26,92 (1.062/1.060)	2,03 (0.08)		C-16-3
21141	25,4/25,35 (1.000/0.998)	2,03 (0.08)		C-16-3S/4

Conical discs
Max. pressure drop 207 bar (3000 psi)
21821 MC ref. no. series



Spare parts

For cartridges, with or without standard single-cavity housings
Cartridge seal kits, comprising external seals and back-up rings, are the only parts available. For details see the "Spare parts" paragraph in the product pages for the particular cartridges.

While standard single-cavity housings (see pages 251 to 258 inclusive) can be ordered separately, they are unlikely to be needed as spare parts.

For standard valve packages and MCD packages
Seal kits for cartridges are available, as indicated above, while any of the accessories detailed in pages 260 to 265 inclusive can also be ordered.

MCD packages may include products not covered by this catalog. Spare parts for such products will be detailed in any relevant spare parts publications.

Repair and warranty

After calling for Return Authorization, any unit for factory repair, or to be returned under warranty, should be sent with a description of the fault to the Vickers Modular or distributor location in your area.

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